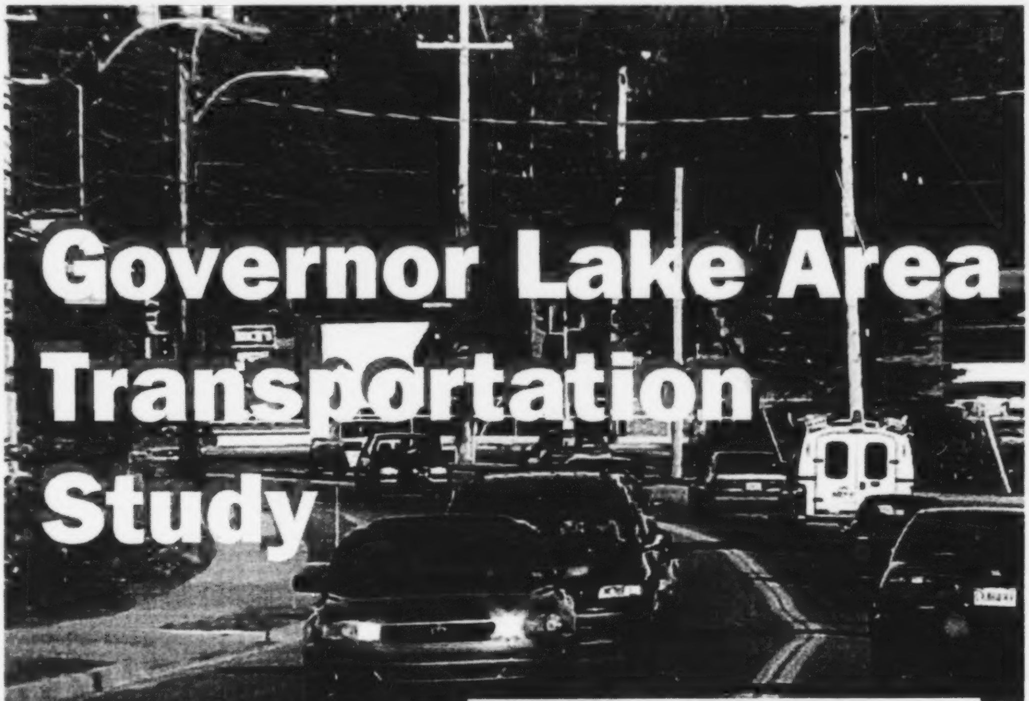
Report

Transportation Study



Governor Lake Area Transportation Study

January 2003

Nova Scotia Department of
Transportation and Public Works
and **Halifax Regional Municipality**

SGE Acres

106-04785/

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December 30, 2002
H015256.17

Ms. Janice Harland, P. Eng.
Department of Transportation & Public Works
PO Box 186
Halifax, NS
B3J 2N2

RE: Final Report - Governor's Lake Transportation Study

Dear Ms. Harland

We are pleased to deliver the final copies of the Governor's Lake Transportation Study incorporating the comments and modifications that were identified from our past review meetings. It has been a pleasure working with your Department and the Halifax Regional Municipality on this assignment. At the start of the project it was our goal to work as an extension to your organization and we feel this was achieved. As a result, while the final report delivery has been somewhat delayed, the final document clearly addresses the goals and objectives defined at the start of the project.

The final report is comprehensive as it provides a thorough explanation of the basis and background to the inputs of the transportation planning and operational assessment process that were the foundation to this study. The report then presents an improvement plan for the study area's transportation system which includes both policy measures and the infrastructure based solutions needed to address anticipated future system deficiencies. The infrastructure based solutions include; the development of new roadway to service new lands, additional access and egress capacity for the study area and a modified internal roadway network to support future system capacity issues. The improvements are presented over the short, medium and long-term planning horizons.

If you have any questions, require clarification or if we can be of any assistance on the implementation of the improvement plan, do not hesitate to call us.

Yours very truly

SGE Acres Limited

A. Robert McLure, M.Eng, P.Eng.
ARM/jb

THE ASSOCIATION OF
PROFESSIONAL ENGINEERS
OF NOVA SCOTIA
VALID FOR THE YEAR 2002
Date: DEC 2002
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LICENCE TO PRACTICE

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Governor Lake Area Transportation Study

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Executive Summary

Introduction

In 2002 the Nova Scotia Department of Transportation and Public Works (TPW) and Halifax Regional Municipality (HRM) retained SGE Acres Limited (formerly SGE Group Inc.) to study transportation implications in the Governor Lake area with specific regard to the area's future development potential.

The study was mandated to provide a reliable, comprehensive and defensible system improvement plan. As outlined in Terms of Reference for this study, the study objectives were to:

- Conduct a detailed transportation study to identify the roadway infrastructure required to provide an acceptable level of safety, capacity, and speed within the study area, based on projected travel demands over the next 20 years; and
- Prepare functional design plans for all proposed highway infrastructure improvements.

Understanding the Problem

The study involved a comprehensive assessment of transportation related factors in the study area. This included:

- A present and future demographic analysis (current and future households and population);
- A review of past reports and documentation;
- A review of planning documents prepared by various development proponents active in the study area;
- Field investigations and data collection including traffic counts, travel time surveys and intersection markings. A full photographic survey was also completed.

A public information session was held to give the consulting team a means to inform residents and business people of the study purpose, intent and methodology as well as to help understand local conditions more fully. The session was held on June 19, 2002 at Beechville-Lakeside-Timberlea School. Approximately 40 people attended the three-hour session. Comments were obtained both orally and in written form.

In addition, one-on-one conversations were held with members of the development community and other stakeholders in the study area.

Key Findings

Existing Development

This study is concerned with the area of Halifax Regional Municipality (HRM) consisting of Beechville, Lakeside, and Timberlea. It also includes lands to the north of Nine Mile River and Governor's Brook presently outside the serviceable area boundary of HRM, as well as Bayers Lake Business Park. The area was first settled around 1816. Formerly a part of Halifax County, it was part of the 1995 amalgamation that resulted in the Halifax Regional Municipality. The population of the area in 1996 was approximately 6,770 persons in 2,325 households.

The current amount of commercial within this area space totals 1,400,000 square feet, mainly contained in the Bayers Lake Business Park. This commercial development has been responsible for dramatic increases in travel to and from the study area. This travel mainly occurs via Highways 102 and 103 and does not, in the main, affect the residential portions of the study area.

At present, the study area is limited to four access points and six lanes of access and egress. These are:

- Timberlea Village Parkway North of Highway 103 (1 lane in/1 lane out)
- Lacewood Drive west of Highway 102 (2 lanes in/2 lanes)*
- Trunk 3 west of Timberlea Village Parkway (1 lane in/1 lane out)
- Trunk 3 East of Lakelands Boulevard (2 lanes in/2 lanes out)

Key elements of the roadway network were evaluated using various computer models and tools. From this analysis of traffic patterns in the area, it was concluded that 30,500 trips per day enter and exit the study area in 2002, with 76 % of all trips attributable to commercial development (mainly the retail component of Bayers Lake Business Park).

The peak movements include 1,375 vehicles exiting in the morning peak hour and 2,155 vehicles per hour (vph) entering in the afternoon peak. Minor system operation problems presently exist at the Highway 103/Trunk 3 Interchange (Exit 2). In late 2002, roadway widening and changes to the existing access ramps were being undertaken to address problems at the Lacewood Interchange. Elsewhere, traffic problems are considered to be generally nonexistent.

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* Note: In 2002/2003 Lacewood Drive was widened to eight lanes in the vicinity of the Bicentennial Highway ramps, but the approach capacity remained the same.

Potential Development

Over the study horizon, lands within the study area could potentially accommodate an additional population of between 22,000 to 23,000 persons in new residential developments. These proposed new developments include an estimated 240,000 square feet of additional commercial space as part of two residential developments, Westgate and the Village at Governor's Run. In addition, the potential exists for an additional 300 acres of land to be developed for Business Park type uses.

Potential Constraints

There are significant constraints that could affect the timing and magnitude of these proposed developments, namely:

Infrastructure and Servicing

- Servicing Boundary Location (Some proposed developments are outside this boundary; to date no decision has been made to permit the boundary to change.)
- Sewage Treatment Plant Capacity (There are cost implications of expanding the Lakeside Sewage Treatment plant; to date, these have not been resolved.)
- Receiving Waters Capacity (There are environmental implications of expanding the Lakeside Sewage Treatment plant; to date, these have not been resolved.)

Business Park and Residential Expansion

- Topography (Expansion of the Bayers Lake Business Park is limited by such constraints as bedrock and topography, which could result in costly solutions to development.)
- Land Ownership (Residential land development is constrained by a provincial park reserve around much of Susie's Lake; as a result, there is finite development potential within the study area.)

Traffic Handling

- Trunk 3 (the existing principal roadway in the study area (apart from Highway 102 and Highway 103, has problematic vertical and horizontal alignments that will ultimately constrain its ability for improvement; the adjacency of residential and commercial development to the roadway adds to this constraint.)
- Lacewood Drive (This street continues to experience traffic growth as a result of commercial and residential growth in the immediate vicinity of the street; its potential as a major through facility is diminished as a result.)
- Bayers Lake Interchange (This interchange is nearing capacity and is experiencing more frequent traffic conflicts and collisions.)

Proposed development of lands adjacent to the study area also has the potential to impact the transportation infrastructure of the study area roadway network. Development of the Western Common and Birch Cove Lakes, while having a limited potential to directly impact Trunk 3, could serve to increase traffic volumes on Highway 103 and the Highway 102/Highway 103/Trunk 3 interchanges at Bayers Lake.

These constraints have been taken into account in the study in defining potential road alignments and in determining probable build out of the study area. The constraints may ultimately result in less intensive development within the 20-year study horizon, and other unforeseen circumstances may come into play to alter the development potential of the area. Notwithstanding, the study has progressed on the assumption that the development magnitude presented above will occur within the horizon period. This basic assumption is necessary to permit a reasonable level of assurance in modelling and developing solutions.

Future Conditions

Based on data contained in various reports and proposals summarized in this report, as well as information obtained from developer interviews and statistical data, the following is a summary of the development potential in the study area.

- The Village at Governor's Run (7,500 population and 120,000 sq. ft. commercial development)
- Kimberly Lloyd holdings (3,200 population (2 parcels))
- Westgate (8,000 Population and 120,000 sq. ft. Commercial)
- Other (4,000-5,000 additional population, 300 acres Business Park)

The total buildout (including existing development) would be a population of approximately 23,000 and 1,647,000 sq. ft commercial (445 acre Business Park). Based on these figures, the traffic modelling and analysis indicates that in the future:

- 72,300 trips per day will enter and exit the area with 50 % attributable to commercial development. Future Peak movements include 5,500 vph (AM – exiting) and 6,500 vph (PM – entering);
- 20 % of residential trips will utilize Trunk 3 (Bay Road) and Highway 102 to access the peninsular Halifax.
- 34% of commercial trips will use the Lacewood Drive access.

As noted earlier, the network is constrained in only a few locations at present. However, based on the modelling and analysis, future residential and commercial development has the potential to create significant new demands on the network. Given that the study area is currently limited to only six lanes of access/egress, capacity will fall below the anticipated traffic demand well before full build out.

Recommendations

Based on the analysis, a roadway improvement package was developed for implementation over the short, medium and long-term as shown in the following table.

Exhibit A: Implementation Schedule and Costs

Location	Improvement Element	Development Served	Estimated Cost
Short-term			
Highway 103, Exit 2 Interchange	Widen roadways at the intersection of Trunk 3/ Hwy 333 and adjust signal timing and phasing plan.	Existing Traffic	$ 213,000
		Sub-total short-term Improvements	$ 213,000
Mid-term			
Timberlea Village Parkway at Trunk 3	Widen intersection approaches and installation of traffic signals.	Governor's Run Westgate	$ 240,000
Timberlea Village Parkway	Widen Timberlea Village Parkway to 4-lanes	Governor's Run Westgate	$ 800,000
Governor's Run – Bayers Lake Connector Roads	Construction of roads with 2-lane cross-section	Governor's Run Bayers Lake Expansion	$ 1,820,000
Highway 103, Exit 2 Interchange	Realign Trunk 3 and Reconfigure the intersection of Trunk 3/ Lakelands Boulevard	Business Park Linkage	$ 4,900,000
		Sub-total mid-term Improvements	$ 7,760,000
Long-term			
Washmill Lake Court Extension / Chain Lake Drive/ Susie Lake Crescent	Construct new roadway with underpass at Highway 102 Reconfigure and widen intersections: - Chain Lake Drive at Washmill Lake Court - Chain Lake Drive at Susie Lake Crescent	Governor's Run Bayers Lake	$ 5,830,000 $ 272,000
East Collector	Construct the East Collector between the Lakeside Industrial Park and Timberlea Village Parkway	Development of adjacent lands	$ 1,500,000
Highway 103/ Timberlea Village Parkway Interchange	Provide directional ramp to permit southbound traffic on the Timberlea Village Parkway to access Highway 103 eastbound Install Traffic Signals at intersection of westbound off-ramp and Timberlea Village Parkway	Westgate Governor's Run	$ 602,000
Highway 103, Exit 2 Interchange	Construct Ragged Lake Connector and associated interchange ramps Traffic Signals: - Chain Lake Drive at Ragged Lake Connector - Ragged Lake Connector at Highway 103 WB On-Ramp	Business Park Linkage Westgate	$ 10,290,000 $ 240,000
Highway 103/ Highway 102 Interchange	Construct additional lane on access ramp to serve traffic accessing Highway 102 Inbound from Highway 103 Eastbound	All developments in Study Area	$ 400,000
		Sub-total long-term Improvements	$ 19.134,000
		Total construction costs 15% Engineering and Contingency 15% HST	$ 27,107,000 $ 4,066,050 $ 4,675,958
		Total Estimated Cost	***$ 35,385,000 (rounded)***

In summary, key components of the improvement package, are:

- Improvements to the existing Highway 103/Trunk 3 interchange (Exit 2);
- Improvements to the Highway 103/Highway 102 Interchange;
- Improvements to the Highway 103/Timberlea Village Parkway interchange; and
- New roadway infrastructure in the Bayers Lake Business Park.

As illustrated by Exhibit A, major infrastructure will be required to accommodate and facilitate growth in the medium and long-term. Given that this infrastructure is not required immediately, alternate means to accommodate growth in travel demand should be explored in the near to mid-term.

It is recommended that the Province and the Halifax Regional Municipality undertake a broad analysis of the practical benefits of Transportation Demand Management (TDM) measures with specific reference to the study area. This analysis should include a broad based of review of solutions from other jurisdictions. In addition to this review, municipal planning efforts should include a determination of means to ensure residential land development is truly supportive of public transit modes. Over the short term, it is recommended that HRM declare its interest in obtaining the active section of the Chester Spur which services the Lakeside Industrial Park at such time as this becomes surplus to Canadian National. This corridor might be used, for example, as a transit priority route.

I Introduction

1.1 Background and Objectives

This study is concerned with the area of Halifax Regional Municipality (HRM) consisting of Beechville, Lakeside, and Timberlea. As shown on the following map, it also includes lands to the north of Nine Mile River and Governor's Brook presently outside the serviceable area boundary of HRM, as well as Bayers Lake Business Park. The area was first settled around 1816. Formerly a part of Halifax County, it was part of the 1995 amalgamation that resulted in the Halifax Regional Municipality. The 1996 Study Area population was approximately 6,770 persons in 2,325 households.

Over the past two decades, there has been significant growth in residential land development in the Study Area and retail development in Bayers Lake Business Park has caused additional traffic growth since 1996. As a result, there have been associated increases in traffic congestion and travel delay. The problems are not endemic – at present, they occur at certain areas – but they affect the entire area because the delays occur on the road links between residential areas and the major areas of employment in the core area of HRM.

Over the past decade, such initiatives as GoPlan, the Interim Regional Transportation Strategy (IRTS) and other efforts have illustrated the need for coordinated transportation planning to support development in various areas of the region. Over the same period, several traffic impact, planning and operational assessment studies have been completed for developments in the Beechville-Lakeside-Timberlea area. Each of them has focussed on a specific aspect or part of the study area, with some studies resulting in changes to the roadway system. These changes have improved the level of service being provided to roadway users, but congestion still exists on Trunk 3 and at the Beechville Interchange.

Demands on the roadway system could significantly increase as a result of proposed future development, resulting in existing congestion becoming more widespread. As a result of these potential traffic impacts, the Nova Scotia Department of Transportation and Public Works (TPW) and Halifax Regional Municipality (HRM) retained SGE Acres Limited (formerly SGE Group Inc.), in early 2002, to study the broad transportation system implications in the area.

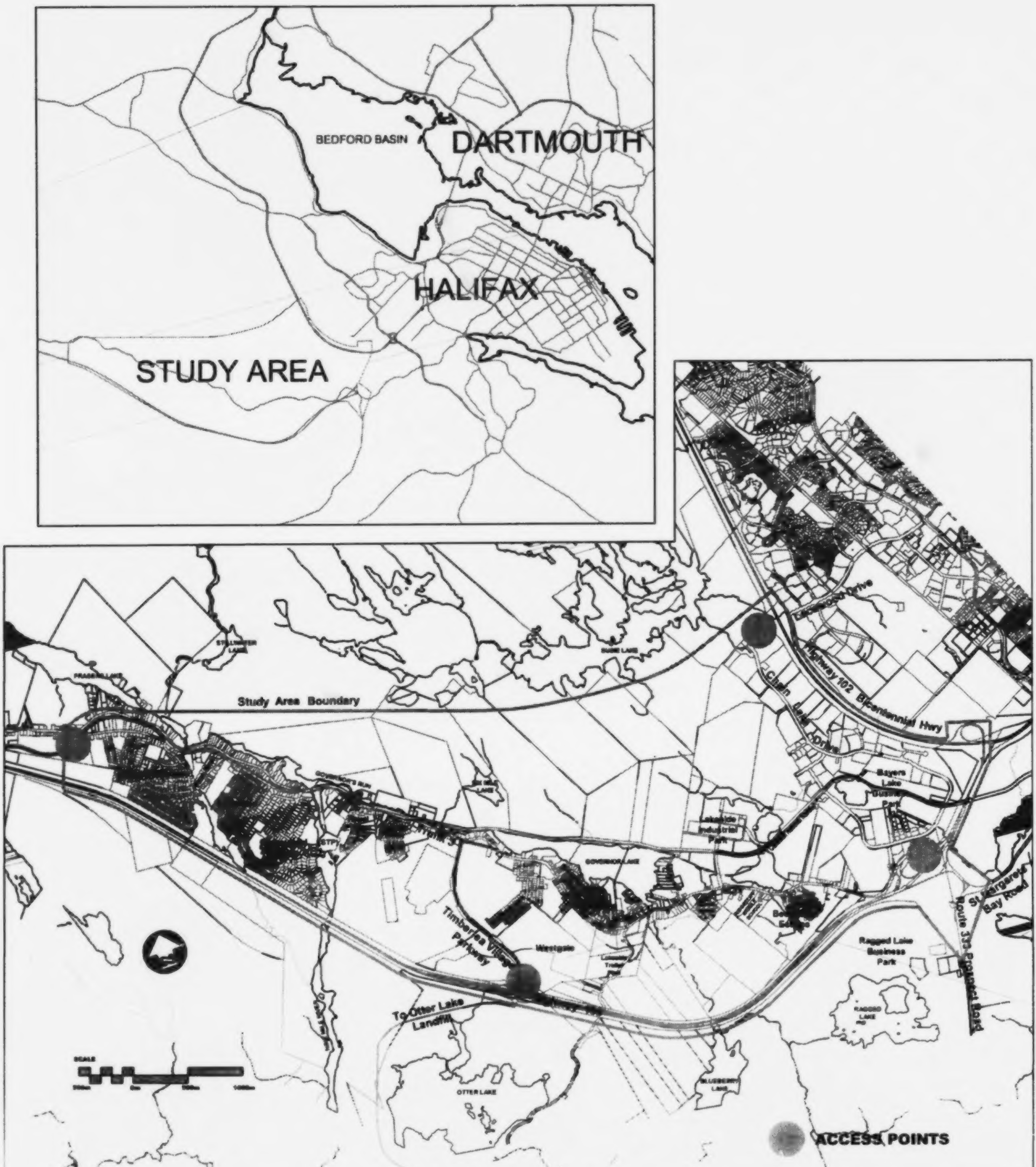
The study was mandated to provide a reliable, comprehensive and defensible system improvement plan and that all stakeholders understand the basis of its findings. As outlined in Terms of Reference for this study, attached in Appendix A, these were the study objectives:

- Conduct a comprehensive transportation study to identify the roadway infrastructure required to provide an acceptable level of safety, capacity, and speed within the study area, based on projected travel demands over the next 20 years; and

Exhibit 1.1 Regional Context

EXHIBIT 1.1
REGIONAL CONTEXT

SGE Acres


BEDFORD BASIN
DARTMOUTH
HALIFAX
STUDY AREA
STILLWATER LAKE
Study Area Boundary
Lacewood Drive
Highway 102 Bicentennial Hwy
Chain Lake Drive
Bayers Lake Business Park
Lakeside Industrial Park
GOVERNOR LAKE
St Margarets Bay Road
Ragged Lake Business Park
RAGGED LAKE
Timberlea Village Parkway
Westgate
Highway 103
To Otter Lake Landfill
OTTER LAKE
BLUEBERRY LAKE
SCALE
ACCESS POINTS

- Prepare functional design plans for all proposed highway infrastructure improvements.

1.2 Previous Studies and Findings

Several previous studies provided important background and insights to the present study. The studies were documented in the following reports and addressed specific development questions of relevance to this study. Appendix B contains a summary of the recommended improvements from each of these past studies and Exhibit 2.4 illustrates some of the key corridor recommendations arising from these studies.

- ***Traffic Management Strategy: Beechville/Lakeside/Timberlea (1996)***
- ***GoPlan Traffic Model Investigation: Final Report (August 1998)***
- ***Bayers Lake Interchange Transportation Study (March 1999)***
- ***Westgate Proposed Commercial Development Traffic Impact Analysis (September 2000)***
- ***Governor's Run Traffic Impact Study (May 2001)***

Studies for adjacent areas:

- ***Birch Cove Lakes Study (1995)***
- ***Planning for Western Common (1999)***
- ***Traffic Impact Study Clayton Park West Phase 4 (1999)***

A brief discussion of the importance of each study and its relevance to the current analysis is presented below.

Traffic Management Strategy: Beechville/Lakeside/Timberlea (1996)
The most comprehensive assessment prior to the present analysis, this study was undertaken to select a strategy to manage future traffic growth resulting from potential residential development in the study area, with specific regard for level of service, capacity and safety issues on Trunk 3. A phased plan of improvements was developed for roadway infrastructure, and consideration was also given to pedestrian, cycling and public transit issues. Development of the Otter Lake Interchange was the most substantial outcome of the study. This study differed from the present study in that it focused mainly on residential growth in the study area. Recommended improvements in the study involved a great deal of forward thinking as many of the proposed improvements contained in Exhibit 2.4 were advanced in this report. Future capacity constraints were also identified with the diamond interchange configuration at the Timberlea Village Parkway/Highway 103 interchange.

GoPlan Traffic Model Investigation: Final Report (August 1998)
This report documents technical refinements carried out on the regional computerized transportation model (QRS II). The model was one of the tools employed in the present analysis. As it was a review of the QRS II transportation model utilized by HRM, no transportation system improvements were noted in this study.

Bayers Lake Interchange Transportation Study (March 1999)
This study was undertaken to identify existing and future (to 2019) deficiencies of the Bayers Lake Interchange in light of the development of Bayers Lake Business Park as a major retailing centre. The study was a peak hour analysis that concluded that continued

growth would require continued expansion of Lacewood Drive in the area of the interchange in order to accommodate traffic without hindering the performance of the exit ramps. Short-term recommendations were to widen Lacewood drive from 4 to 6 lanes (adopted by HRM Council in August 2002) and to make provisions for widening to 8 lanes in the long term. Another long-term recommendation, to be implemented concurrent with the widening to 8 lanes, would be the replacement of the left turn movement from Lacewood Drive (called Timberlea Drive on the west side of Highway 102) to Chain Lake Drive with a grade separated directional ramp. Timberlea Drive would have 'one or more intersections west of Chain Lake Drive to provide additional access to the Business Park". The study also concluded that an additional access should be provided to the park in the long term. The extension of Washmill Lake Court under Highway 102 was the preferred method.

Governor's Run Traffic Impact Study (May 2001)
This was a Traffic Impact Assessment for the proposed Governor's Run land development, (now referred to as The Village at Governor's Run) based on a proposed roadway network that ties into Timberlea Village Parkway and Lakeside Boulevard, as well as to Lacewood Drive. In this study, the compatibility of the Governor's Lake Development with the area's existing and planned transportation infrastructure was reviewed. Levels of Service were evaluated at the intersections of Route 3/Timberlea Village Parkway and Route 3/Lakeside Industrial park access. Roadway operations were also reviewed along the Timberlea Village Parkway, Route 3, Lacewood Drive, sections of Highway 102 and 103 and at the Highway 103 interchange. Public transit, pedestrian and cycling issues were also reviewed. The Study found that over a 25-year development horizon, Highway 103 would have adequate capacity to accommodate traffic. The capacity of the access ramps at the Timberlea Village Parkway Interchange (Exit 3) would likely be approached however, and the capacity of the Timberlea Village Parkway would be constrained by increases in traffic on Route 3 traffic. The Parkway would also alleviate some traffic on Route 3; however, Route 3 would require widening to 4-lanes east of Lakeside Park Drive. In addition, it was concluded that the Governor's Run development would have little or no impact on the capacity or level of service on Lacewood Drive. No action has been taken to date on this study, as approval of the development proposal is subject to other reviews mainly related to the serviceable area boundary extension.

Westgate Proposed Commercial Development
Traffic Impact Analysis (September 2000)
This study was a Traffic Impact Analysis (TIA) for a mixed commercial development at the intersection of the Otter Lake Interchange (Exit 3) and Timberlea Village Parkway. The development would include a 43,000 square foot Sobey's store, coffee outlet, service station with car wash, fast food, and retail expansion (to 60,000 square feet). The report also includes trip generation estimates for a proposed golf course and the residential component of the development (8,000 population in 10 years). It found that the Timberlea Village Parkway would need to be widened from 2 to 4 lanes with appropriate auxiliary turning lanes within ten years and signals would also be required on Timberlea Village Parkway.

The report also noted that the available stopping sight distance for southbound vehicles approaching the Timberlea Village Parkway/Commercial Driveway was less than desirable. The turning/crossing sight distance to the north of the intersection for vehicles exiting the commercial site was less than desirable. In addition, it was recommended that the existing off ramp from Highway 103 westbound be modified to a standard intersection configuration with a stop-controlled right turn movement.

Adjacent Areas

Birch Cove Lakes (1995)

This was a study to review the physical and environmental constraints and opportunities in developing the Birch Cove Lakes area immediately north of the study area, west of Highway 102. It recommended a new road to run parallel to Highway 102 that would service privately owned land between the highway and a series of lakes known collectively as the Birch Cove lakes. The largest is called Susie Lake. As envisioned at the time, the road would connect to Lacewood Drive as an extension of Chain Lake Drive. The traffic implications were not studied at the time. Nor were they within the scope of the present study to consider in detail.

Traffic Impact Study Clayton Park West Phase 4 (1999)

This study was undertaken to determine traffic impacts of a 110-acre mix of residential, commercial and office uses on specific adjacent roadway elements consisting of Lacewood Drive and the Bayers Lake Interchange. The study was precipitated by the developer securing a development commitment from Home Depot and the fact that the various other uses were proposed for imminent construction in the area. As a result of the report recommendations, signals were installed on Lacewood Drive at intersections with Fairfax Drive and Parkland Drive. This is one of two studies of Lacewood Drive that have attempted to deal with the intense level of retail development and attractiveness of the Lacewood corridor.

Planning for Western Common (1999)

The purpose of this study was to develop a long-term vision for an 8,000-acre parcel of public land on the western boundary of the developed area of Halifax. The bulk of the land was formerly water supply watershed land that had been declared surplus. A part of the land had been adopted for use as a new landfill. The study looked at the environmental capability of the site, public demands, and developer interest. The result was a recommended land use plan that apportioned the holdings into four main uses: community development "Urban Village" (200 acres); Large-scale recreation area (300-400 acres for such uses as Golf, equestrian, soccer, ballfield); mixed-use development (56 acres of commercial plus 10,000 population); Near Urban Wilderness Park (remainder). The study contains a vision for extending Lacewood Drive to the Otter Lake Interchange and also shows a grade-separated connection between the Ragged Lake and Bayers Lake business park areas. This study is important to the present analysis in terms of helping to identify long term development potential adjacent to the study area.

II The Study Area

This section provides a detailed description of the study area and discusses the roadway and land development currently approved or proposed.

2.1 Land Use and Development

2.1.1 Existing Development

The study area comprises about 1,940 hectares (4,800 acres). Existing residential development covers approximately 375 hectares (925 acres). Until recently, the traditional development pattern followed Trunk 3. In the past two decades, the majority of new residential development has occurred in subdivisions at the western end of the study area. The eastern end has been the focus of significant growth related to commercial development with the construction of more than one million square feet of commercial space at Bayers Lake Business Park. This area comprises about 210 hectares (520 acres) and has a mix of both retail development and commercial developments such as offices. Lakeside Industrial Park contributes a further 50 hectares of developed industrial land within the study area.

2.1.2 Approved and Proposed Development

The potential for growth suggests an additional 22,000 to 23,000 people could be accommodated in the study area in the medium to long term (25 years). This would far surpass the present population of less than 7,000. At present, the only major approved development is called **Westgate** – a residential development (approved in January 2002) with a planned population of about 8,000 (3,200 units). Full build-out would include a golf course, retail centre and a town centre. Complete development of the project is subject to the provision of additional capacity at the Nine Mile River Sewage Treatment Plant.

The final phases of another major development, **Beechville Estates**, are continuing near the eastern end of the study area.

The **Bayers Lake Business Park**, consisting of both commercial retail and industrial uses, has experienced significant growth in the last decade. There is some potential for continued growth in the next decade and beyond, with a potential expansion capability to 500 hectares (1,300 acres), providing significant obstacles are overcome. A recent study (Planning for the Western Common EDM, 1999) studied the development potential of municipal holdings west of the current retail area in Bayers Lake Business Park and found that topographical constraints could limit development potential of these holdings.

The major unapproved development proposal is the **Village at Governors Run**. With a proposed population of approximately 7,500 residents, this development would be developed on the north side of Governor's Run, the main waterway in the study area, and a section of Nine Mile River. This proposal is dependent on the realignment of the serviceable area boundary in order to proceed.

Exhibit 2.1 Existing and Proposed Development

Project:

Governor's Lake Area Transportation Study

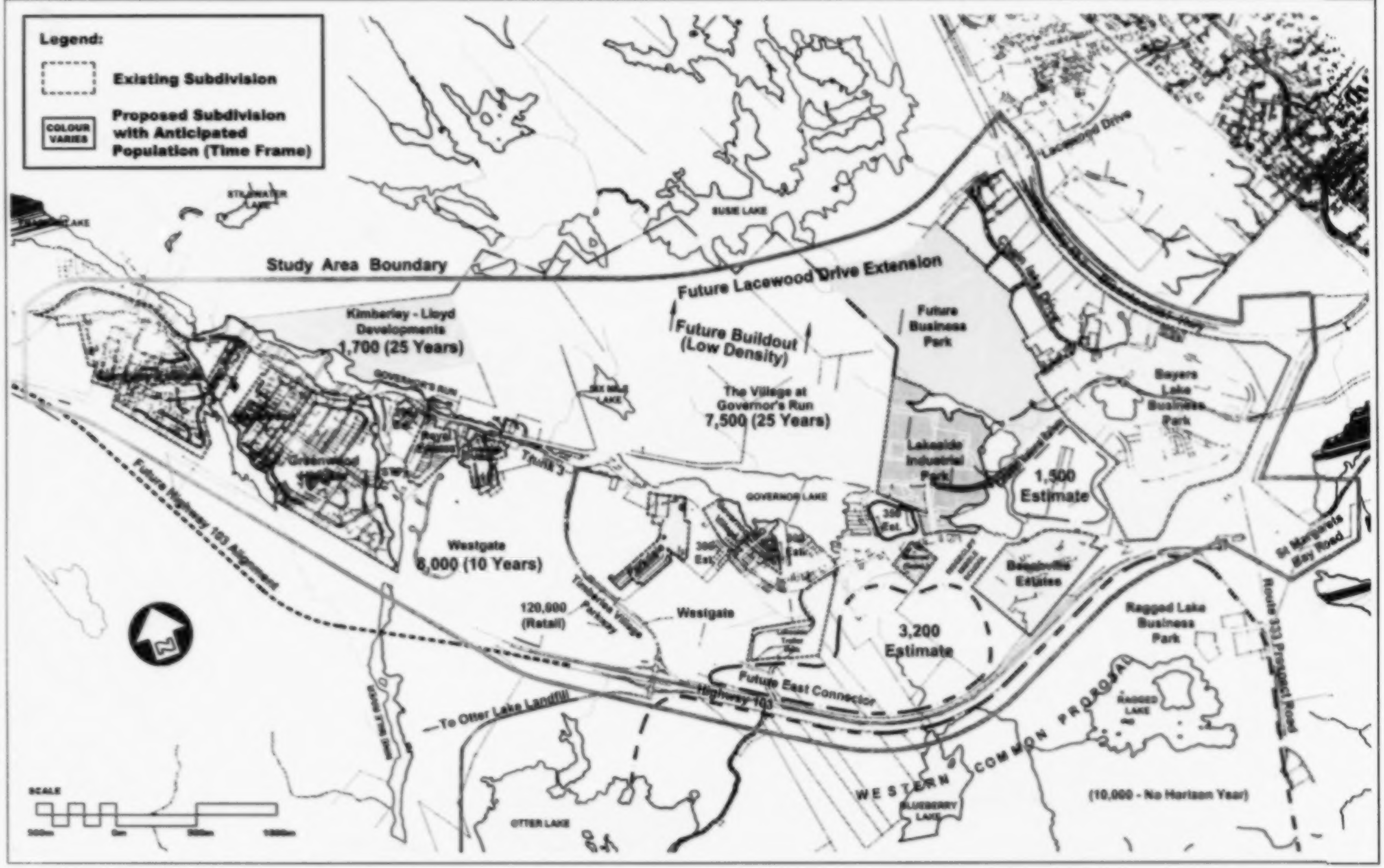
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 2.1

Existing and Proposed Development

SGE Acres


Legend:
Existing Subdivision
COLOUR VARIES
Proposed Subdivision with Anticipated Population (Time Frame)
STILLWATER LAKE
SUSIE LAKE
Study Area Boundary
Lacewood Drive
Future Lacewood Drive Extension
Future Business Park
Future Buildout (Low Density)
Kimberley - Lloyd Developments 1,700 (25 Years)
GOVERNOR'S RUN
SIX MILE LAKE
The Village at Governor's Run 7,500 (25 Years)
Bayers Lake Business Park
Lakeside Industrial Park
1,500 Estimate
Trunk 3
Greenwood
GOVERNOR LAKE
300 Est.
350 Est.
Westgate 8,000 (10 Years)
Beechville Estates
St Margarets Bay Road
Future Highway 103 Alignment
120,000 (Retail)
Timberlea Village Parkway
Westgate
3,200 Estimate
Ragged Lake Business Park
Route 333 Prospect Road
Future East Connector
Highway 103
To Otter Lake Landfill
RAGGED LAKE
WESTERN COMMON PROPOSAL
BLUEBERRY LAKE
OTTER LAKE
(10,000 - No Horizon Year)
N
SCALE
500m
0m
500m
1000m

During the course of the project, the Study Team met with the following individuals to discuss future development and related issues in the Study Area:

- Gary Pierce, Rob McPherson - Kimberly-Lloyd Developments Ltd.
- Jock Fiske, John Fiske - Parkview Realty
- Larry Swinamer - Nine Mile River Investments/Larex Properties
- Kenny Silver - Metro Transit
- Paul Morgan, Tom Rath - Halifax Regional Municipality
- Mary Ann McGrath Halifax-Bedford Basin MLA.

2.1.3 Other Development Potential

Unconsolidated Lands

In addition to the proposed developments listed above, several parcels of land under various owners have the potential to accommodate 3,200 to 3,500 additional residents under currently permitted densities. The largest parcel located west of Beechville Estates and would be served by the proposed Eastern connector. Eastern Broadcasting Limited is the other major landowner in the area. Given that there are certain topographical constraints to development within the area and as the land would probably need to be consolidated to achieve full build-out potential, a long term (25 year) development horizon has been applied for the purposes of this study.

Western Commons / Ragged Lake Business Park

Ragged Lake Business Park is part of the Western Commons planning area. HRM's Corporate Real Estate Services division reports, "While it is not anticipated that the [Ragged Lake] Park will expand in the near future, long-range plans include linking Lakeside with Bayers Lake Business Park."

While it is currently located outside the current serviceable area boundary, a recent study for the Western Common proposed that an additional future population of 10,000 could be accommodated given the available water and sewer capacity. A brief residential market assessment prepared for the study, noted that CMHC projects that housing demand in HRM will decrease to 1,800 units annually between 2000 and 2005. Between 2006 and 2010, demand is projected to decrease to 1,600 units per year. The Western Commons study assumed that the site would attract 5% of this demand for a site share of 75 units per year.

Birch Cove Lakes Area

In 1995, a study was commissioned by the former City of Halifax to investigate environmental constraints and opportunities for development on lands immediately north of the study area. The extensive land area contains numerous large lakes and could be highly attractive for residential development. However, as a large portion of the lands is part of the provincial crown holdings, development of the area appears to be limited. Notwithstanding, there is a substantial amount of land in private hands adjacent to Highway 102 that would have long-term development potential. The potential population has not been estimated, however a potential road connection into the study area has been considered as part of the analysis for the present study.

2.1.4 Summary and Conclusions

Over the study horizon, lands within the study area could potentially accommodate an increased population of between 22,000 to 23,000 persons in new residential developments. These proposed new developments also include an estimated 240,000 square feet of commercial space. In addition to this primarily retail commercial space in the Westgate and Village at Governor's Run developments, the potential exists for an additional 300 acres of land to be developed for Business Park type uses.

However, there are constraints that may affect the timing and magnitude of this proposed development, namely:

- Infrastructure and Servicing
    - Servicing Boundary Location (planning/political)
    - Sewage Treatment Plant Capacity (cost)
    - Receiving Waters Capacity (environmental/cost)
- Business Park and Residential Expansion
    - Topography (rock, pressure zones, pumping)
    - Land Ownership (constrained by park reserve)
- Traffic Handling
    - Trunk 3 (vertical, horizontal alignment; adjacency of development)
    - Lacewood Drive (continued traffic growth)
    - Bayers Lake Interchange (nearing capacity)
    - Otter Lake Interchange (capacity with future development).

Development of the Western Common and Birch Cove Lakes, located adjacent to the Study Area, also have the potential to impact the Study Area transportation infrastructure. While the impacts of these two developments on Trunk 3 would be limited, additional increases in traffic volumes on Highway 103 and Highway 102/Highway 103/Trunk 3 interchanges would occur.

2.2 Roadway Network

An understanding of the key characteristics of the existing roadway network is a basis for formulating solutions to transportation system problems. To accomplish this, a review of major components of the existing roadway infrastructure and proposed roadways to accommodate future development was conducted. This section summarizes the review.

2.2.1 Existing Roadway Infrastructure

Existing roadway infrastructure in the study area includes roadways of differing classification including:

- Portions of the Provincial 100-Series Highway network (Highways 102 and 103)
- Provincial Highways (Trunk 3 and Route 333)
- Major municipal arterial and collector roadways such as Lacewood Drive and Chain Lake Drive

- Local streets that provide access to the arterial and collector roadways for existing areas of development.

The key existing roadways in the study area are:

- Highway 103 – This route is part of the Provincial primary arterial highway system and provides linkages between HRM and the South Shore of Nova Scotia. Commuter mobility is also provided to other areas of HRM such as Tantallon via this route. Between Exit 2 and Exit 3 at the Timberlea Village Parkway, the road has a four lane divided, open median cross-section and a posted speed of 100 km/hr. To the west of Exit 3, the roadway has a two-lane undivided cross section and a 100 km/hr posted speed.
- Highway 102 (Bicentennial Highway) – This route is also part of the Provincial primary arterial highway system and has National Highway System designation. A portion of this route passes through the study area. It has a regional function to serve as a linkage between the Peninsular Halifax, Bedford and Sackville areas and also provides a major connection to northern Nova Scotia, the Trans Canada Highway and New Brunswick. Access to the study area is provided at the Lacewood Drive and Highway 103 interchanges. This route has a posted speed of 100 km/hr with a four-lane divided barrier median cross section.
- Trunk 3 – This is the principal secondary roadway in the area and is also known as St. Margaret's Bay Road or Bay Road. It runs the length of the study area and provides a required alternative to Highway 103. Trunk 3 has a two lane rural cross-section through most of its length. Parts of the roadway within the study area have sidewalks and a multi-year program of sidewalk extension is currently being implemented by HRM. Left turn bays have been introduced at key intersections, and other intersections at the entrance to subdivisions will be widened as demand warrants. The road has numerous short vertical and horizontal curves that would likely prove expensive to reduce due to property acquisition and social costs.
- Route 333 – This roadway is an important commuter linkage to suburban land developments in the Hatchett Lake/Prospect area of HRM. This is the main route to Peggy's Cove from the core of HRM. Peggy's Cove is also one of the province's main tourism destinations, resulting in Route 333 being the busiest tourist route in the Province. It also provides access to Exhibition Park (which results in periodic traffic peaks) and to the Ragged Lake Business Park. Route 333 is a two-lane rural facility with left turn bays at important intersections.
- Lacewood Drive – This road is a four-lane divided curbed median roadway with widening at intersections. Access is permitted only at intersections. It has experienced significant growth in traffic volumes as a result of the development of major retail components in the Bayers Lake Business Park and, more recently, with new commercial and residential development on either side of Lacewood Drive.

Exhibit 2.2 Road Network

Project:

Governor's Lake Area Transportation Study

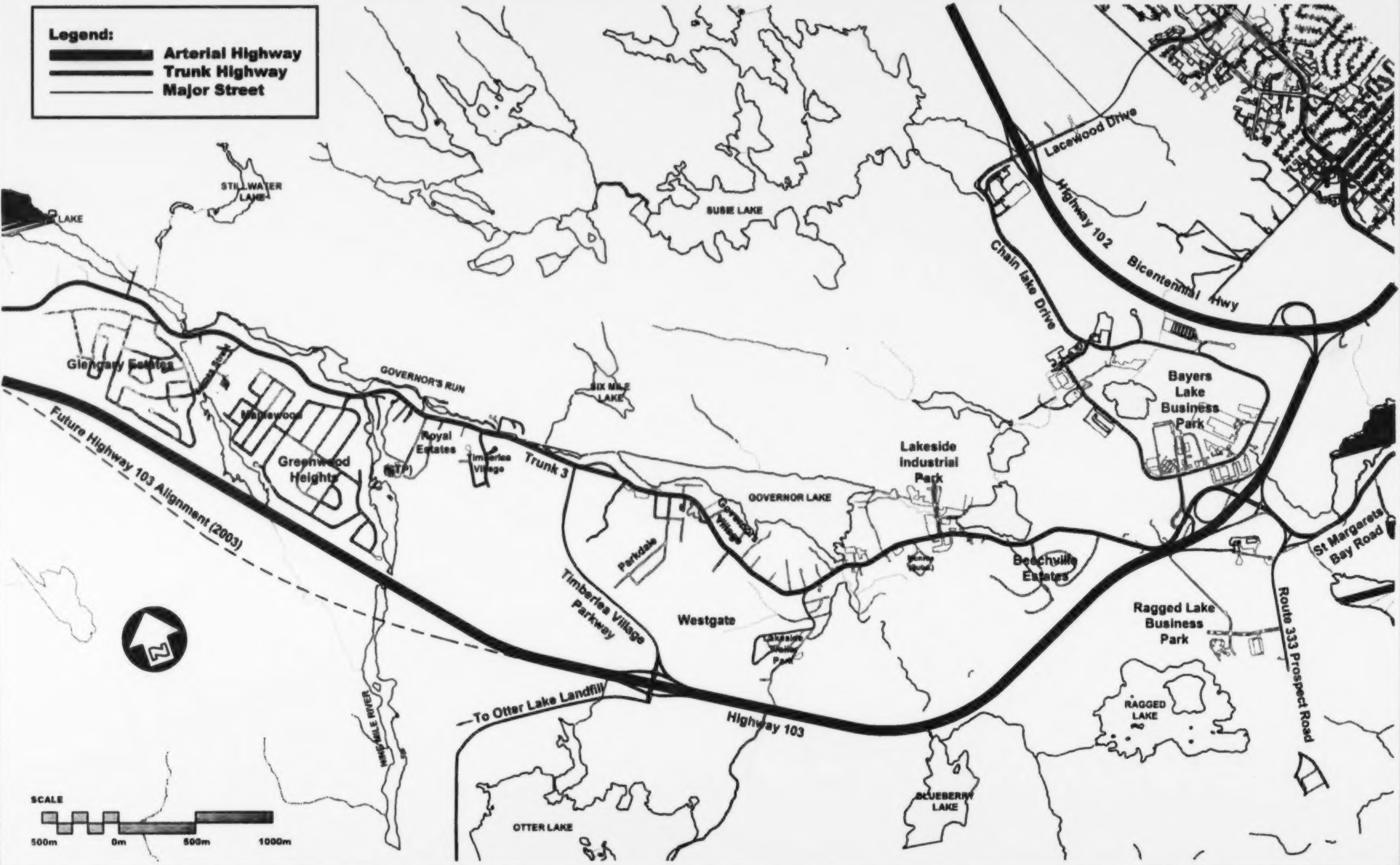
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 2.2

Road Network

SGE Acres


Legend:
Arterial Highway
Trunk Highway
Major Street
STILLWATER LAKE
LAKE
SUSIE LAKE
Lacewood Drive
Highway 102
Bicentennial Hwy
Chain lake Drive
Bayers Lake Business Park
Glengarry Estates
Maplewood
GOVERNOR'S RUN
SIX MILE LAKE
Royal Estates
(STP)
Timberlea Village
Greenwood Heights
Trunk 3
Lakeside Industrial Park
GOVERNOR LAKE
Governor's Village
Parkdale
Beechville Estates
St Margarets Bay Road
Future Highway 103 Alignment (2003)
Timberlea Village Parkway
Westgate
Park
Ragged Lake Business Park
Route 333 Prospect Road
NINE MILE RIVER
To Otter Lake Landfill
Highway 103
RAGGED LAKE
N
BLUEBERRY LAKE
OTTER LAKE
SCALE
500m
0m
500m
1000m

- Chain Lake Drive – Similar to Lacewood Drive, Chain Lake Drive is a four-lane curbed median divided roadway with widening at intersections. Access is permitted at both intersections and driveways, some of which are signalized. It has experienced significant growth in traffic volumes as a result of the retail commercial development in Bayers Lake Business Park.

Existing daily traffic volumes on roadways in the Study Area are shown in Exhibit 2.3. Where required, the traffic count data was normalized to 2002 volumes through the use of an appropriate growth rate and average week adjustment factors provided by Transportation and Public Works.

2.2.2 Proposed Road Works

Four major roadways have been proposed in previous reports, but none are currently slated for construction. The intent and presumed benefit of each major element is briefly discussed below and illustrated in Exhibit 2.4. A complete list of recommended improvements, as presented in earlier reports, is included in Appendix A.

- **Widening of Timberlea Village Parkway to 4 lanes.** The Parkway was built in 1997 with a two-lane undivided cross section. Sufficient right of way exists to widen it to four lanes, and it is expected that such a widening will be required by the time the Westgate project is completed.

- **East Connector.** The East Connector was proposed as a complimentary element to the Timberlea Village Parkway (originally referred to as the "West Connector"). It would connect the Parkway to Trunk 3 at Lakeside Boulevard (Lakeside Industrial Park). A route for this connection has been partly secured by HRM's purchase of property opposite Lakeside Boulevard. The timing of development of the East Connector appears to be dependent on the development of lands through which it will pass. As the lands are currently held among various landholders, the timing of the road may be well into the future. This roadway has been proposed with an initial two-lane cross-section with left turn bays at intersections along its length along with sufficient right-of-way to accommodate widening to four lanes.

- **Lacewood Extension.** Lacewood Drive was extended to Highway 102 with the expectation that it would continue into and past the Bayers Lake Business Park through to Trunk 3. The enormous growth of traffic on Lacewood Drive and at the Bayers Lake Exit has given cause to question the desirability of making this extension. The question will be explored further in this report.

- **Washmill Lake Court Extension.** The predicted continuance of traffic growth in the Bayers Lake Business Park led to the conclusion (ARTM, 2000) that a secondary access to the park should be provided in the future. The recommended method was via the extension of Washmill Lake Court under Highway 102 to connect with the collector road system of Clayton Park West. Lands have been reserved by HRM in the business park to permit the extension when required.

Exhibit 2.3 Traffic Flow and Link Volumes

Project:

Governor's Lake Area Transportation Study

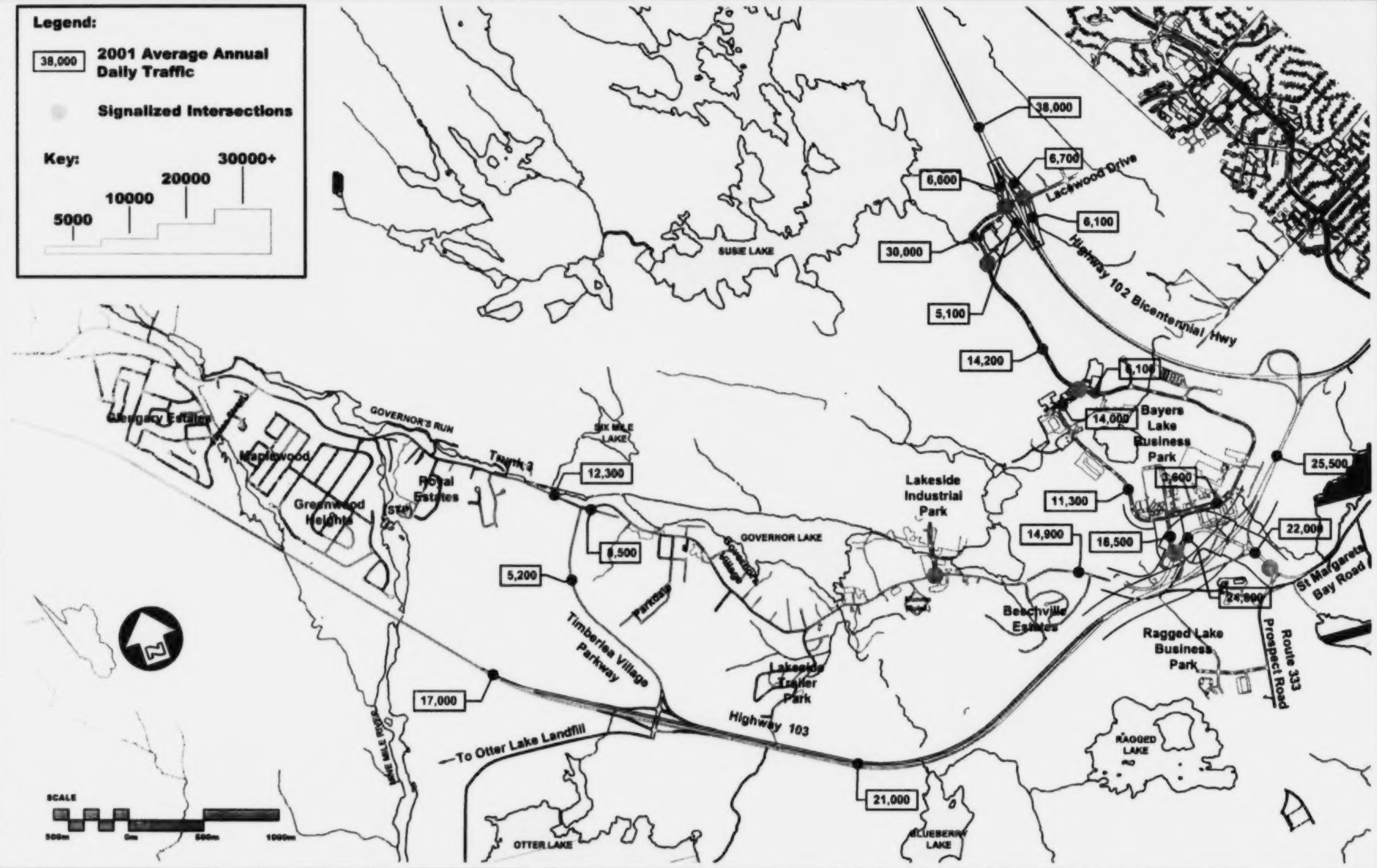
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 2.3

Traffic Flow & Volumes

SGE Acres



Legend:
38,000
2001 Average Annual Daily Traffic
Signalized Intersections
Key:
5000
10000
20000
30000+
38,000
6,700
6,600
Lacewood Drive
6,100
30,000
Highway 102 Bicentennial Hwy
5,100
14,200
6,100
14,000
Bayers Lake Business Park
25,500
3,600
11,300
22,000
14,900
18,500
24,800
St Margarets Bay Road
Route 333 Prospect Road
Ragged Lake Business Park
RAGGED LAKE
Beechville Estates
Lakeside Industrial Park
SUSIE LAKE
GOVERNOR LAKE
Governor Village
Parkdale
Lakeside Trailer Park
SIX MILE LAKE
12,300
8,500
5,200
Timberlea Village Parkway
Highway 103
21,000
BLUEBERRY LAKE
To Otter Lake Landfill
OTTER LAKE
17,000
GOVERNOR'S RUN
Trunk 3
Royal Estates
STP
Glengary Estates
Maplewood
Greenwood Heights
NINE MILE RIVER
N
SCALE
500m
0m
500m
1000m

- **Lakeside Industrial Park – Bayers Lake Business Park Connector.** This roadway was identified as a beneficial connection between Trunk 3 and Highway 102 and to serve as a linkage between the two business parks. The timing of the construction of this roadway would be determined by the requirement to link the two industrial areas and adjacent land development, however the potential for this route to provide an alternative truck route would require it to be completed at the same time as the East Collector. Completion of the roadway at this time would provide truck routing to the Highway 103 interchange at Otter Lake. Three alternate alignments have been proposed for this roadway:

    - A north-south linkage from Dominion Crescent to Lacewood Drive.
    - A westward extension of Susie Lake Drive to Duck Pond Road.
    - A parallel roadway to the existing CN Rail line that would intersect Chain Lake Drive in Bayers Lake Business Park.

- **Mainland South Ring Road.** This alignment was proposed under the Go Plan consultation process in 1997. The Ring Road was proposed to begin as an extension of Lacewood Drive, pass through the study area to Ragged Lake, then pass across Route 333 to the Kidston Lake area, then terminate at Purcell's Cove Road.

- **Overpass to Ragged Lake.** Various planning exercises for the Business Parks Office of HRM Real Property Services have identified the need or desirability of a direct connection between Bayers Lake and Ragged Lake Business Parks. At present, the Ragged Lake Business Park does not have direct access to the 100 series highway system, and the connection would also provide this necessary access.

Exhibit 2.4 Previously Proposed Road Works

Project:

Governor's Lake Area Transportation Study

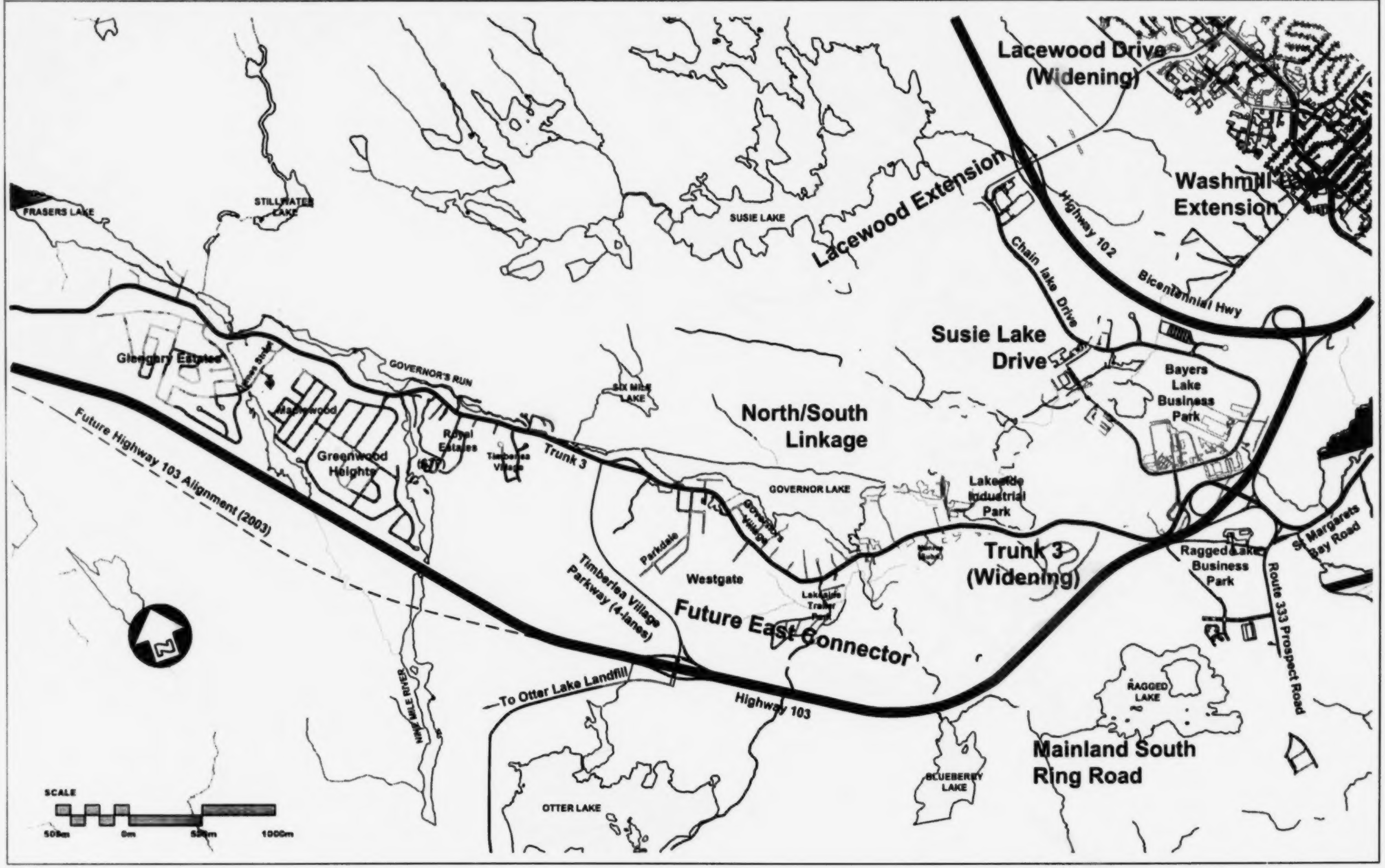
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 2.4

Previously Proposed Road Works

SGE Acres



Lacewood Drive (Widening)
Washmill Extension
Lacewood Extension
Highway 102
Bicentennial Hwy
Chain lake Drive
Susie Lake Drive
Bayers Lake Business Park
FRASERS LAKE
STILLWATER LAKE
SUSIE LAKE
Glengarry Estates
GOVERNOR'S RUN
SIX MILE LAKE
North/South Linkage
Greenwood Heights
Royal Estates
Timberlea Village
Trunk 3
GOVERNOR LAKE
Governors Village
Lakeside Industrial Park
Parkdale
Westgate
Lakeside Trailer Park
Trunk 3 (Widening)
Ragged Lake Business Park
St Margarets Bay Road
Route 333 Prospect Road
Future Highway 103 Alignment (2003)
Timberlea Village Parkway (4-lanes)
Future East Connector
To Otter Lake Landfill
Highway 103
NINE MILE RIVER
RAGGED LAKE
Mainland South Ring Road
BLUEBERRY LAKE
OTTER LAKE
N
SCALE
500m
0m
500m
1000m

2.3 General Overview of Existing Operations

An understanding of existing problems on the existing roadway network is a basis for formulating solutions to transportation system problems. To accomplish this, a field investigation was conducted and public input was solicited at an Open House held in the Study Area. This section summarizes the review. A more detailed review of existing operations is provided in Section IV.

2.3.1 Field Investigation

Field investigations included traffic counts and travel time surveys, as well as the collection of data about specific intersections.

Traffic counts: In June 2002, data on turning movements were obtained for 19 intersections. This task was a cooperative effort between HRM and SGE Acres. The results of the counts are displayed in the appendices. These data were incorporated into the Synchro software (Section 3.4), and used to help calibrate the QRS model.

Travel Time Surveys: SGE Acres personnel conducted peak hour travel time surveys on six alternate routes during the AM Peak and PM Peak analysis periods:

- Trunk 3/James Street intersection to Northwest Arm Drive via Trunk 3
- Timberlea Village Parkway/Trunk 3 intersection to Trunk 3/Highway 103 EB off Ramp via the Timberlea Village Parkway and Highway 103
- Lakelands Boulevard/ Trunk 3 Intersection to Northwest Arm Drive via Trunk 3, Highway 103 and Highway 102
- Highway 103 Otter Lake Interchange to Northwest Arm Drive via Highway 102 and Highway 103
- Lakelands Boulevard/ Trunk 3 Intersection to Highway 102/Lacewood Drive Interchange via Trunk 3, Highway 103 and Highway 102
- Highway 102/Lacewood Drive Interchange to Lakelands Boulevard Trunk 3 Intersection via Chain Lake Drive.

From the travel time surveys, no major delay points were noted with travel speeds generally no less than 80% of the posted speed.

Other data: Data collected at intersections included number of lanes, posted travel speeds, turn restrictions and other relevant data. A full photographic survey was also completed at the same time. The data collected was used to help in developing the Synchro analysis.

2.3.2 The Public Perspective

A public information session gave the consulting team a means to inform residents and business people of the study purpose, intent and methodology as well as to help understand local conditions more fully. The session was held on June 19, 2002 at Beechville-Lakeside-Timberlea School. Approximately 40 people attended the three-hour session. Comments were obtained both orally and in written form.

One-on-one conversations were held with most of the attending members of the public. Typically, visitors were given an overview of the display materials and asked if they had any questions or comments. The evening was cordial with a good flow of information between the consultants and those attending. The planning team found it helpful to hear residents' insights on current traffic problems and to get a better understanding of local traffic patterns. For example, certain assumptions regarding trip making and route choice were clarified by our discussions. These insights were incorporated into the model.

A hand-back questionnaire was used for written feedback (Appendix B provides a sample form). Five questionnaires were received. All respondents were resident homeowners in the study area. Comments were sought on such items as areas of primary concern, secondary concerns, and proposed solutions to problems.

Comments on ***primary concerns*** included the need for sidewalks and crosswalks; the fact that Timberlea Village Parkway needs to be widened to four lanes; access and egress to the downtown (Armdale Rotary and Highway 102); and that a cycling lane should be provided on the major streets (or roads should at least be wide enough for bicycles).

Comments on ***secondary concerns*** included the need for traffic signals at the intersection of the Timberlea Village Parkway and Trunk 3; the dwindling capacity of Trunk 3; number of access points to the study area; lack of pedestrian facilities in some areas; and a desire to see the "rails to trails' extended to Bayers Lake Business Park (the former rail line through the community has been converted to a multi-purpose trail; the trail ends at the Lakeside Industrial Park where the rail line is still in use: see further discussion in Section 5.6.

Proposed solutions offered by respondents included a Park and Ride facility with a direct transit route to the downtown area of HRM; access to Exit 3 should be 4 lanes wide with traffic signals and turning lanes; finally, access to and from Peninsular Halifax be addressed (Armdale Rotary; possibly a reversible lane on Quinpool Road).

Major land owners and land developers were also contacted and interviewed for this study. Interviews were also conducted with personnel from Metro Transit and the Real Property Division of HRM. The principal intents of these interviews were to inform the proponents and to obtain current and relevant information about the proposals. All of the contacted individuals were helpful and generally forthcoming with information. The data obtained through this process was incorporated into the models as appropriate.

III Traffic Model Development

3.1 Introduction

The process for determining future roadway system needs followed a traditional transportation planning approach. The steps of understanding trip **generation**, **distribution** and roadway **assignment** were followed in a progressive manner and this chapter describes the assumptions and findings for each step. Further to the traditional transportation planning approach was the need to review operational performance of the existing and planned system. Exhibit 3.1 illustrates the application and integration of the QRS-II planning model and the Synchro/Sim Traffic operational assessment tools employed to address the study traffic and planning assessment requirements.

The planning process first determined travel and traffic characteristics in the Study Area and the trip generation from the area was calculated for the residential, commercial and industrial components for both existing and proposed developments. A trip distribution was then developed for the existing case and full build out scenario using input from past HRM transportation master planning efforts. The QRS II model was used for the assignment of the trips to the roadways in the Study Area. Calibration was performed at each of the steps: trip generation, distribution and assignment.

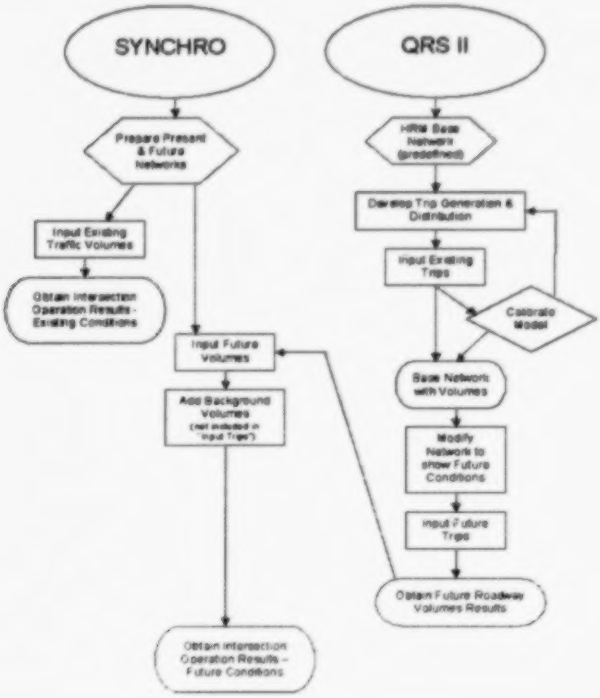

SYNCHRO
QRS II
Prepare Present & Future Networks
HRM Base Network (predefined)
Develop Trip Generation & Distribution
Input Existing Traffic Volumes
Input Existing Trips
Obtain Intersection Operation Results - Existing Conditions
Calibrate Model
Input Future Volumes
Base Network with Volumes
Add Background Volumes (not included in "Input Trips")
Modify Network to show Future Conditions
Input Future Trips
Obtain Future Roadway Volumes Results
Obtain Intersection Operation Results – Future Conditions

Exhibit 3.1 Modelling Process

3.2 Trip Generation

3.2.1 Residential Trip Generation

A comparative assessment of the trip generation characteristics was performed during the course of the study. This involved comparing the results of the Institute of Transportation Engineers' (ITE) Trip Generation equations with a series of 24-hour traffic volume counts. These 24-hour counts were conducted in June of 2002 at subdivisions where one access location was provided. This allowed for the actual traffic generated by a set number of dwelling units to be determined.

Based on this data, it was found that the trip generation using the ITE rates tended to overestimate the number of trips generated by dwelling units. Actual observed traffic volumes were between 73% and 96% of the traffic volumes forecast using the ITE Equations. An earlier assessment of the relationship between the ITE rates and actual residential trip generation values conducted by HRM found that local values were 84% of those published by ITE. As a result, of these past studies and assumptions, the residential trip generation in the Study Area was first calculated using the ITE rates and then calibrated by multiplying by 0.85 to obtain a value representative of local conditions.

In assessing the traffic generated by future development, the total population for each of the proposed residential developments was used as a basis for determining the number of households. Populations in each of the proposed development areas were divided by a factor of 2.5 persons/household to determine the number of dwellings in each of the proposed developments.

The trips generated by the residential components of each proposed development were then calculated by using the ITE equations and the 0.85 multiplier for local conditions. The trip generation for the existing and proposed residential development in the Study Area is provided in Exhibit 3.2.

3.2.2 Commercial/Industrial Trip Generation

The trip generation for the existing and proposed commercial and industrial developments in the Study Area was based on information contained in previous studies and the ITE Trip Generation Manual.

3.2.2.1 Commercial Development

Existing commercial development in the Study Area is focused at Bayers Lake Business Park which includes a variety of "big box" retailers such as a supermarkets, a home improvement center, a discount store, a book store, multiplex cinemas, clothing stores, as well as numerous smaller retail stores, coffee outlets, and restaurants. Because the site is essentially a multi-use retail development given the variety of retail land uses, there is a good potential for traffic synergy among the retail uses at the site. Based on this interaction, whereby persons accessing the site may visit two or more different retail establishments, the retail component of the site would function in a similar manner to a shopping center. Based on this premise, the square footage for each of the

Exhibit 3.2 Residential Trip Generation (External-Internal Vehicle Trips)

Existing Development	**Dwellings**	**AM Peak**		**PM Peak**	
		Enter	**Exit**	**Enter**	**Exit**
Glengarry Estates	676	87	262	278	156
Between Glengarry Estates-Royal Estates	113	16	48	55	31
Greenwood/Maplewood	440	57	172	189	106
Royal Estates	52	8	25	28	15
Timberlea Village	76	11	34	39	22
Parkdale	101	14	43	50	28
Between Governor's Village-Royal Estates	67	10	31	35	19
Governors Village	144	20	60	69	39
Between Beechville-Governor's Village	147	20	61	70	40
Munroe Subdivision	41	7	21	22	13
Lakeside Trailer Park	115	16	49	56	32
Beechville Estates	150	21	62	72	40
Total	**2122**	**289**	**867**	**962**	**541**

Future Development	**Population**	**Dwellings**	**AM Peak**		**PM Peak**	
			Enter	**Exit**	**Enter**	**Exit**
Governor's Run	7,500	3,000	381	1,143	1,064	598
Westgate	8,000	3,200	406	1,219	1,127	634
Kimberly-Lloyd	1700	680	88	263	279	157
Western Common *	10,000	1,875	239	716	696	392
Parcel west of Royal Estates	200	80	12	35	41	23
Parcel east of Parkdale	300	120	17	51	59	33
Parcel east of Governor's Village	300	120	17	51	59	33
Lands east of Lakeside Trailer Park	3,200	1,280	164	491	494	278
Parcel south of Lakeside Industrial Park	300	120	17	51	59	33
Lands north of Beechville Estates	1,500	600	78	233	249	140
Total	**33,000**	**11,075**	**1,417**	**4,252**	**4,126**	**2,321**

Located outside and adjacent to the Study Area, the Western Commons area has been included in the model due to its potential influence on the Highway 103 interchanges.

individual retail uses were totaled and the total trips generated at this site based on the ITE Shopping Center rates. The Westgate and Governor's Run Developments will also include commercial components. A Traffic Impact Study prepared for the Westgate Development (*Westgate Proposed Commercial Development: Traffic Impact Analysis* - Delphi, 2000) indicated that the development would include a supermarket, gasoline/service station with convenience market, fast food restaurant, coffee outlet, shopping centre and 18-hole golf course. The trip generation for the Westgate Development was taken directly from the Traffic Impact Study.

Based on conversations with the developer, the Governor's Run development will include two retail centers, one at 100,000 square feet and one assumed at 20,000 square feet in size. Since the nature of the business expected to occupy these centers is unknown at this point, the ITE Shopping Center rates were considered the best possible choice for analysis purposes. Each of the developments were computed separately and then added together to sum up the total number of commercial trips attracted to this area.

As with the existing Bayers Lake Commercial Development, the commercial trip generation was adjusted to reflect pass-by traffic through the application of a 25% pass-by trip rate (i.e., percentage of all site trip generation from pass-by trips). Although we anticipate a rate higher than 25%, on the assumption that the development will serve the Governor's Run development and surrounding areas and that the retail uses will be of a type that has a high potential to draw pass-by traffic, we have elected to use 25% as a conservative rate. The trip generation for the existing and proposed commercial areas is summarized in Exhibit 3.3.

Exhibit 3.3 Commercial Trip Generation – (External-Internal) Vehicle Trips

	ITE Land Use Code	Variable	AM Peak			PM Peak		
			Enter	Exit	Total	Enter	Exit	Total
Westgate [1]			308	225	533	434	436	870
Governor's Run	820	120 ksf	94	51	145	255	285	540
Bayers Lake Existing Retail	820	1,400 ksf	319	174	493	1080	1203	2282
Bayers Lake Existing Industrial Park	130	145 acres	786	174	961	191	710	901
Bayers Lake Future Industrial Park	130	197 acres	1152	251	1403	255	956	1211
Western Common Industrial Park	130	100 acres	582	128	710	145	536	680
		Total	**3241**	**1003**	**4245**	**2360**	**4126**	**6484**

ITE Land Use Code 130 – Industrial Park
ITE Land Use Code 820 – Shopping Center

1. Trip Generation values for the commercial components of the Westgate Development were obtained from the report *Westgate Proposed Commercial Development: Traffic Impact Analysis* (Delphi Systems Inc, September 2000)

3.2.2.2 Industrial Areas

For the industrial areas of the Bayers Lake Business Park, the proposed Western Common Business Park and the proposed expansion of the Bayers Lake Business Park, the ITE trip generation rate for Industrial Parks was used. This land use is characterized by a mix of manufacturing, service, and warehouse facilities with a wide variation in the proportion of each type of use. In some cases, an industrial park may contain a large number of small businesses and others with one or two dominant industries. The trip generation of the Lakeside Industrial Park was not calculated as the traffic volumes entering and exiting this industrial park were obtained in the traffic count program. Trip generation for Bayers Lake Business Park and future industrial areas is provided in Exhibit 3.3.

3.3 Trip Distribution and Assignment

The next steps in the analysis were to distribute the existing and future trips generated by the study area land uses and to assign them to the existing roadway network. The trip distribution focused on understanding the origin and destination of trips between to the Study Area and the remainder of HRM based on past transportation planning conducted

Project:

Governor's Lake Area Transportation Study

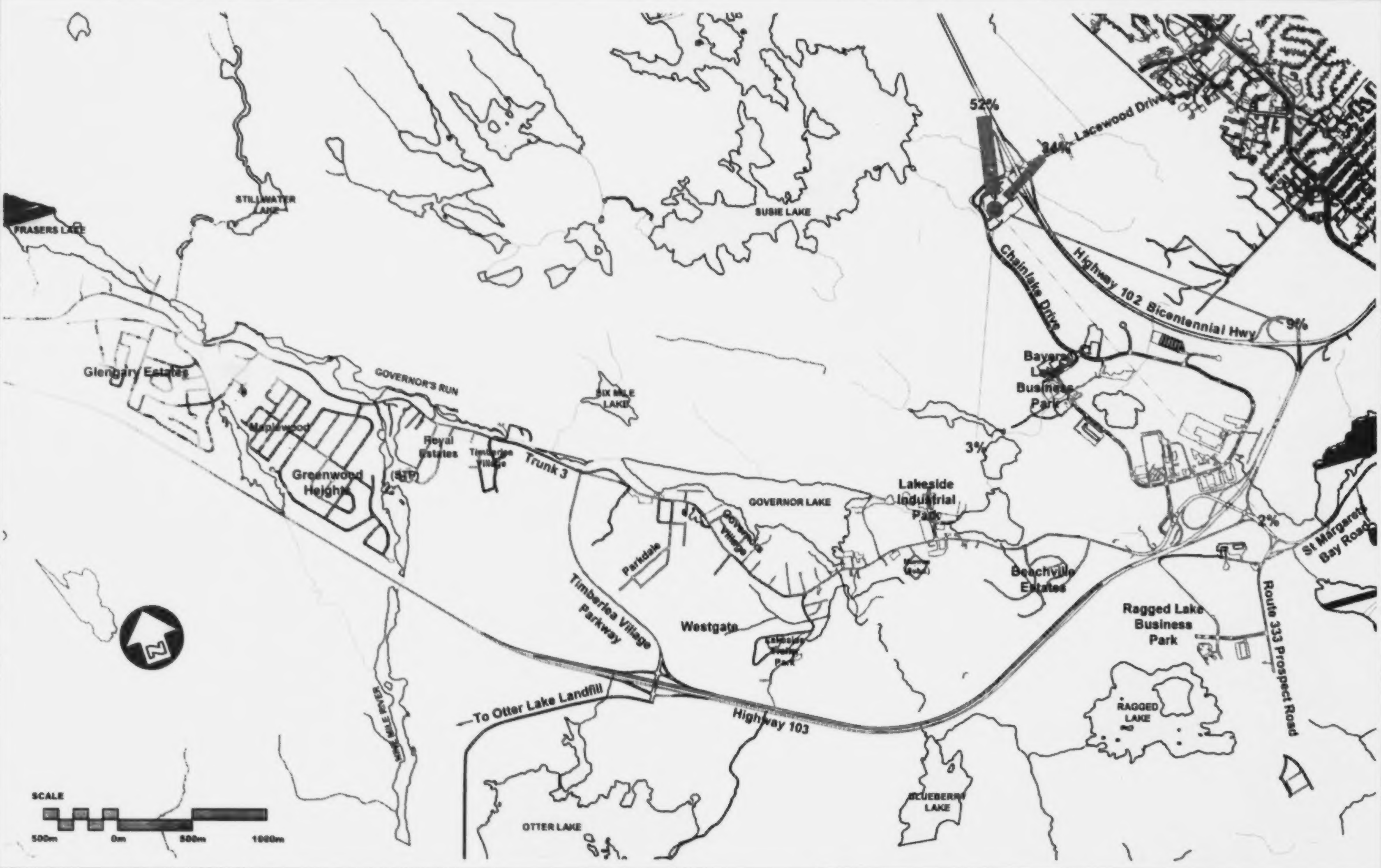
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 3.3

Retail Trip Distribution (Full Build out)

SGE Acres



52%
24%
Lacewood Drive
Chainlake Drive
Highway 102 Bicentennial Hwy
9%
Bayers Lake Business Park
3%
2%
St Margarets Bay Road
Route 333 Prospect Road
Ragged Lake Business Park
RAGGED LAKE
Beechville Estates
Lakeside Industrial Park
GOVERNOR LAKE
Governor's Village
Parkdale
Westgate
Timberlea Village Parkway
To Otter Lake Landfill
Highway 103
BLUEBERRY LAKE
OTTER LAKE
SUSIE LAKE
SIX MILE LAKE
STILLWATER LAKE
FRASERS LAKE
Glengarry Estates
GOVERNOR'S RUN
Maplewood
Greenwood Heights
Royal Estates
Timberlea Village
Trunk 3
NINE MILE RIVER
N
SCALE
500m
0m
500m
1000m

by HRM. The trip assignment examined which roadways or access points were utilized by the traffic originating from and destined to the Study Area.

3.3.1 Trip Distribution

The trip distribution was based on information from HRM's QRS II transportation model. While this model was calibrated for the PM Peak period only, the distribution from this model was deemed to be acceptable for both the AM Peak and PM Peak analysis periods as the predominate trip from the study was assumed to be a home based trip. Separate trip distributions were used for residential and retail trips.

The first step in this assessment was to examine the origins and destinations of all roadway users crossing cordons on four key roadway links between the study area and the remainder of HRM:

- Lacewood Drive east of Highway 102
- Highway 102 east of the Highway 102/Highway 103 interchange
- Trunk 3 west Route 333
- Highway 102 North of the Lacewood Drive interchange.

A traffic zone system was developed based on that used in the QRS II model. This involved grouping the Traffic Analysis Zones that were not in the study area into six larger areas called super zones. The intent of the analysis was to generally determine the key trip interchanges between the study area and the remainder of HRM for key roadway links. A select link analysis was performed on the four roadway links listed above. This feature of QRS II allows for the traffic volumes for each origin and destination pair to be determined. Traffic originating from and destined to the Study Area was aggregated in the analysis allowing the trip distributions to be identified on the basis of the access points to the Study Area.

Origin and destination distributions for home-to-work trips to and from the study area are shown in the following exhibit. This trip distribution was used in calibrating the model for existing conditions and was then used to develop the "future conditions" model.

Exhibit 3.4 Residential Trip Distribution

Origin/Destination	**Trip Distribution**
Highway 102 North of Lacewood Drive	17%
Highway 102 East of Highway 103	44 %
Lacewood Drive east of Highway 102	4 %
St. Margaret's Bay Road	20 %
Trunk 3 West of Glengarry Estates	7 %
Highway 103 West of Timberlea Village Parkway	8 %

As shown in Exhibit 3.4, 17 percent of traffic utilizes Highway 102, north of Lacewood Drive, for the home-to-work trip, with four percent utilizing Lacewood Drive. The majority of the traffic, totalling 64%, is destined for areas served by Highway 102 inbound to the core of HRM and St. Margaret's Bay Road. The remaining fifteen percent of the traffic accesses areas to the west of the study area either via Trunk 3 or Highway 103.

For the retail-based trips, a trip distribution for the existing case was developed through the use of the QRS II model using a similar methodology to the residential trip distribution. This information is shown graphically in Exhibit 3.5.

A separate retail trip distribution was also prepared for the future development scenario to account for the new retail development in the area as shown in Exhibit 3.6.

Bayers Lake Business Park is considered a regional shopping centre. It attracts trips from a larger geographic area than would a local shopping centre. Since this is of close proximity to existing development on Trunk 3, Bayers Lake was considered as a local shopping centre for this existing development. With new retail development (i.e. competing stores), and the future residential developments, Bayers Lake Business Park will continue to be a regional shopping centre but will be less attractive than other stores located closer to new residences. Bayers Lake will most likely continue to generate the same number of trips, however the trip patterns will be slightly different. The future trip distribution for Bayers Lake is therefore adjusted to take into account this competition factor.

The future retail developments within Westgate and Governor's Run are considered local centres and consequently will not attract many trips from outside the study area. Trip distribution networks were determined for each development and were based on their proximity to future residential developments, the size of the residential developments and their proximity to competing retail developments.

The analysis of the trip distribution had a higher percentage of retail-based traffic accessing the site via Lacewood Drive and Highway 102 North of Lacewood Drive than on Highway 102 East. While this maybe surprising, the higher proportion of traffic accessing the site via Highway 102 North is a function of the area's role as a regional shopping centre.

These trip distributions were applied to the trip generation results in a spreadsheet and used to create a user-supplied trip table to the QRS II model (Addtrips.txt). The QRS II model was then used in accordance with the methodology outlined by HRM to obtain a trip assignment for the AM Peak and PM Peak analysis periods.

Of the trips to and from the retail area in Bayers Lake, 50% will access the area from Highway 102 to the North of Lacewood Drive and 32% will access the site from Lacewood Drive to the west. Eight percent will have origins and destinations in areas that can be accessed via Highway 102 in Peninsular Halifax, with 2% accessing the retail development via Trunk 3 west of Route 333 (St. Margaret's Bay Road). Of the total trips at full build out of the area, three percent will be from the residential areas in the study area and five percent will be from areas out of the study area to the west via route 103.

3.5

Project:

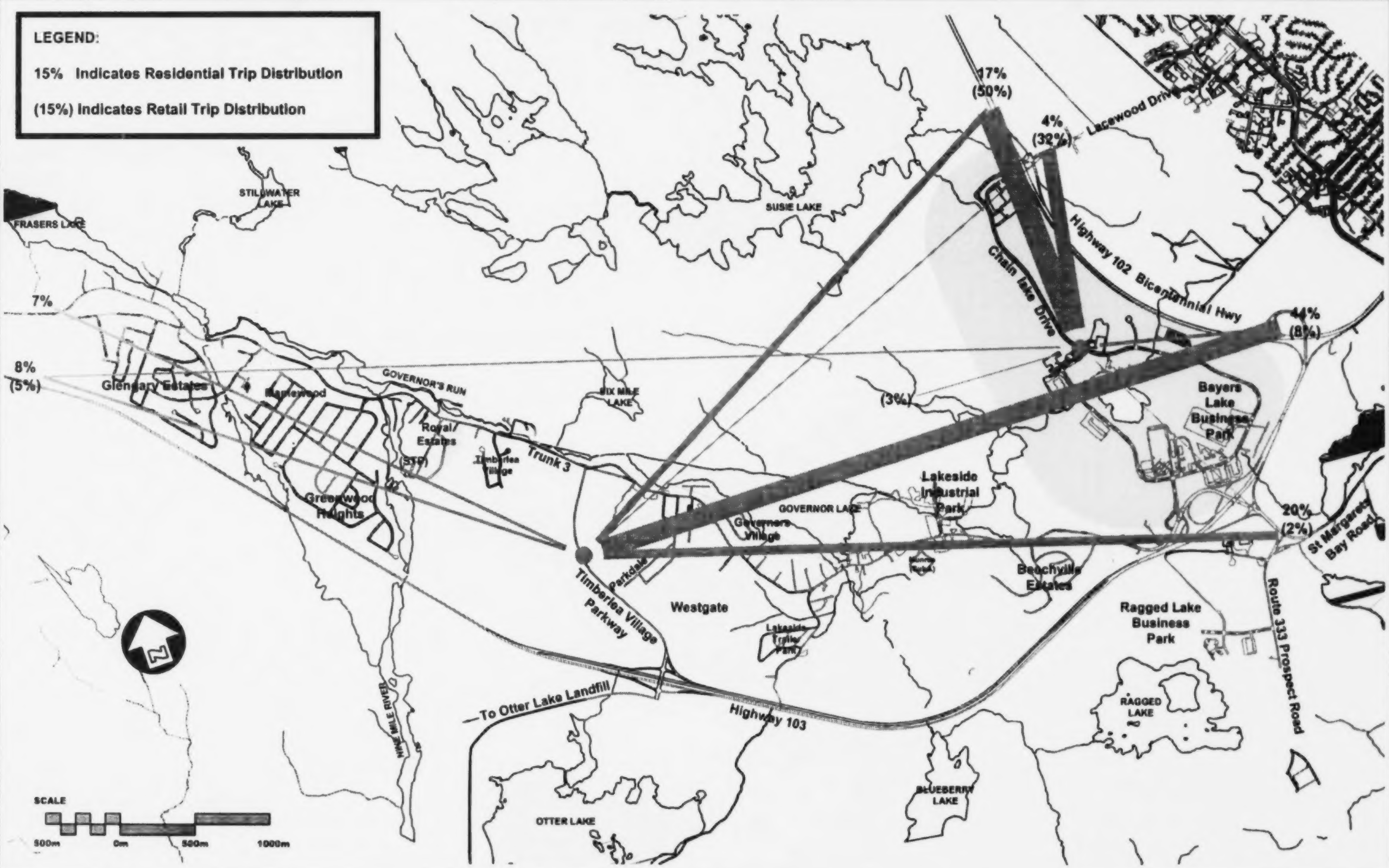
Governor's Lake Area Transportation Study

BEECHVILLE - LAKESIDE - TIMBERLEA

Title: *Exhibit 3.5*

Residential and Retail Trip Distribution (Full Build out)

SGE Acres



LEGEND:

15% Indicates Residential Trip Distribution

(15%) Indicates Retail Trip Distribution

17%
(50%)
4%
(32%)
Lacewood Drive
Highway 102 Bicentennial Hwy
Chain lake Drive
44%
(8%)
(3%)
Bayers Lake Business Park
20%
(2%)
St Margarets Bay Road
Route 333 Prospect Road
Ragged Lake Business Park
RAGGED LAKE
Lakeside Industrial Park
Beechville Estates
GOVERNOR LAKE
Governors Village
Lakeside Trailer Park
Westgate
Parkdale
Timberlea Village Parkway
Highway 103
To Otter Lake Landfill
OTTER LAKE
BLUEBERRY LAKE
SUSIE LAKE
SIX MILE LAKE
Trunk 3
Timberlea Village
Royal Estates
(STP)
GOVERNOR'S RUN
Maplewood
Greenwood Heights
Glengary Estates
STILLWATER LAKE
FRASERS LAKE
7%
8%
(5%)
NINE MILE RIVER
N
SCALE
500m
0m
500m
1000m

Exhibit 3.6 Retail Trip Distribution

Origin/Destination	Trip Distribution
Existing Trip Distribution	
Bayers Lake Retail Area	
Highway 102, north of Lacewood	46%
Lacewood Drive, east of Highway 102	30%
Highway 102, east of Highway 103	7%
Trunk 3 west of Route 333	2%
Highway 103, west of Timberlea Village Parkway	5%
Study Area	10%
Future Trip Distribution	
Bayers Lake Retail Area	
Highway 102, north of Lacewood	50%
Lacewood Drive, east of Highway 102	32%
Highway 102, east of Highway 103	8%
Trunk 3 west of Route 333	2%
Highway 103, west of Timberlea Village Parkway	5%
Study Area	3%

3.3.2 Trip Assignment

The next step was to assign the trips generated in the Study Area to the roadway network. This was accomplished through the use of the QRS II transportation model. The retail and residential trip distributions were applied to the trip generation results to obtain the overall trip distribution for trips to and from the Study Area. This resulted in the creation of a user-supplied Trip Table for the QRS II model (Addtrips.txt). The QRS II model was then used in accordance with the methodology outlined by HRM to obtain a trip assignment for the AM Peak and PM Peak analysis periods.

3.4 Model Calibration

To assess the future trip assignment and to obtain traffic volumes for the analysis of the future transportation system, a QRS II model was developed based on the QRSII model network for the Halifax Regional Municipality. This model, obtained from HRM, was calibrated for the PM Peak Hour and was used to develop the overall trip distribution and perform the trip assignment.

To analyse future travel, the QRSII network was modified to improve the level of detail of the roadway network and development patterns in the study area. Areas of HRM external to the study area were modelled as a grouping of centroids based on the trip distribution analysis. This network was then used for the traffic assignment step in which the future traffic was assigned to roadway links in the study area. This allowed for the determination of future traffic volumes for use in the functional planning of network improvements (Section V).

Prior to analysing future travel demand, the QRS II model was calibrated for the existing level of development to ensure that it provided an adequate representation of traffic volumes on key roadway links between the Study Area and the remainder of HRM. This trip calibration involved reviewing the entering and exiting volumes from the Study Area and comparing these modelled volumes with observed count volumes. This comparison was based on a cordon line approach around the Study Area with volumes for the AM Peak and PM Peak periods compared at the following four locations:

- Lacewood Drive east of the Highway 102 interchange
- Trunk 3 at the Lakelands Boulevard Intersection
- Timberlea Village Parkway north of the Highway 103 interchange
- Trunk 3 West of Fraser Road.

Through the review of the actual and modelled volumes for the existing development, it was noted that the modelled vehicle trips, particularly those entering and exiting Bayers Lake Business Park area, were 15% higher then those observed in the traffic counting program. Based on a review of land uses and transportation planning data regarding Home-based shopping trips, a 15% reduction was applied to the existing and future residential trip generation in the area. This factor accounts for the fact that Bayers Lake Business Park, while being a regional shopping area, would function as a local or neighbourhood shopping centre for the Study Area given its close proximity.

In calibrating the assignment, a review of traffic volumes on key roadway links led to the following changes to better reflect current traffic volumes:

- The capacity on Trunk 3 was reduced to 1,300 vehicles, consistent with findings of the earlier *Traffic Management Strategy for Beechville Lakeside Timberlea* (1996).
- The attractiveness of the Timberlea Village Parkway was reduced by adjusting the speed and capacity.
- The capacity on Lacewood Drive was reduced to 1,800 vehicles/hour between the two signalized intersections at the Highway 102 interchange

Results of the calibration are presented below in Exhibits 3.7 and 3.8.

Exhibit 3.7 *AM Peak Calibration – Existing Case*

	Modelled Volumes			**Count Volumes**		
	In	**Out**	**Total**	**In**	**Out**	**Total**
Lacewood Drive west of Hwy 102	428	165	593	438	290	728
Trunk 3/Lakelands Boulevard	841	590	1,431	613	585	1,198
Timberlea Village Parkway	136	373	509	99	390	489
Trunk 3 West of Fraser Road	99	118	217	100	83	183
Total	**1,504**	**1,246**	**2,750**	**1,250**	**1,348**	**2,598**

In the AM Peak analysis period, the total entering and exiting volumes agree to within six percent, with the modelled volumes being six percent higher (152 vehicles) that the actual counts. This provides a conservative estimate of traffic levels given that background traffic, passing through the Study Area with origins and destinations beyond the Study Area was not modelled. The model tends to overestimate traffic volumes entering the Study Area at the Trunk 3/Lakelands Boulevard intersection by approximately 200 vehicles in the PM Peak hour.

Exhibit 3.8 *PM Peak Calibration – Existing Case*

	Modelled Volumes			**Count Volumes**		
	In	**Out**	**Total**	**In**	**Out**	**Total**
Lacewood Drive west of Hwy 102	913	1,064	1,977	920	789	1,709
Trunk 3/Lakelands Boulevard	733	1,042	1,775	890	1,157	2,047
Timberlea Village Parkway	415	234	649	334	109	443
Trunk 3 West of Fraser Road	132	122	254	56	111	167
Total	**2,193**	**2,462**	**4,655**	**2,200**	**2,106**	**4,366**

For the PM Peak analysis period, the modelled volumes are again higher than the counted volumes, by seven percent or 289 vehicles. The model has higher volumes exiting on Lacewood Drive than was observed in the field.

The development of a calibrated model for the existing development levels allowed for the impacts of various roadway improvements on traffic volumes to be forecast and assessed (see Section V). The improvement packages, with future development levels, were modelled in QRS II to obtain the resulting traffic volumes. With these traffic volumes, the roadway operations of the future roadway improvement packages were assessed. Future traffic volumes from the QRS II model were then input into the roadway network created with Synchro to examine the traffic operations of the proposed network.

IV Current System Operations

4.1 Traffic and Travel Findings

Based on the data contained in the previously summarized reports and development proposals, as well as information obtained from developer interviews, field analysis, and public meetings, the existing roadway network was evaluated. From our review and data collection efforts current and future development in the Study Area can be summarized as follows:

- Current: Study Area Population Approximately 6,770 (1996 Census). Non-residential land uses include 1,400,000 square feet of commercial space and 145 acres of business/industrial parks.

- Future: Projected Population about 30,000. Non-residential land uses will include 1,647,000 sq. ft of commercial floor space and 445-acres of business/industrial parks.

Roadway traffic volumes were determined from ground counts and simulated using planning models to reflect actual conditions within a reasonable degree of calibration. Exhibit 4.1 presents actual versus simulated roadway volumes for the major links in the study area network. Key findings of the review of traffic volumes include:

- In 2002, 30,500 trips per day entered and exited the study area with 76 % of all trips attributable to commercial development (mainly the Bayers Lake Business Park retail area).
- The current peak traffic volume movements include 1,375 vehicles exiting in the morning peak hour and 2,155 vehicles per hour (vph) entering in the afternoon.
- The future estimate of trips concludes that 72,300 trips per day will enter and exiting the area with 50 % attributable to commercial development.
- The estimated future peak hour traffic volumes generated from the study area are 5,500 vph (AM – exiting) and 6,500 vph (PM – entering).
- The main point of access for residential trips is via Trunk 3 and Highway 102, which serve over 20% of all residential generated traffic.
- The main point of access for commercial trips is Lacewood Drive, which serves 34% of all trips.
- The field surveys concluded that minimal delays were present on the majority of the roadway network with the exception of some problems near the Lacewood interchange and the operations of St. Margaret's Bay Road.

4.2 Detailed Operational Analysis

To further examine the operations of the current roadway system, existing traffic operations were analyzed. This analysis used actual turning movement counts assembled during the Study. These traffic counts were adjusted to reflect a common day of week and week of year situation. These turning volumes were input into the Synchro/SimTraffic software along with other information such as intersection lane

Exhibit 4.1 Observed vs modeled volumes

Project:

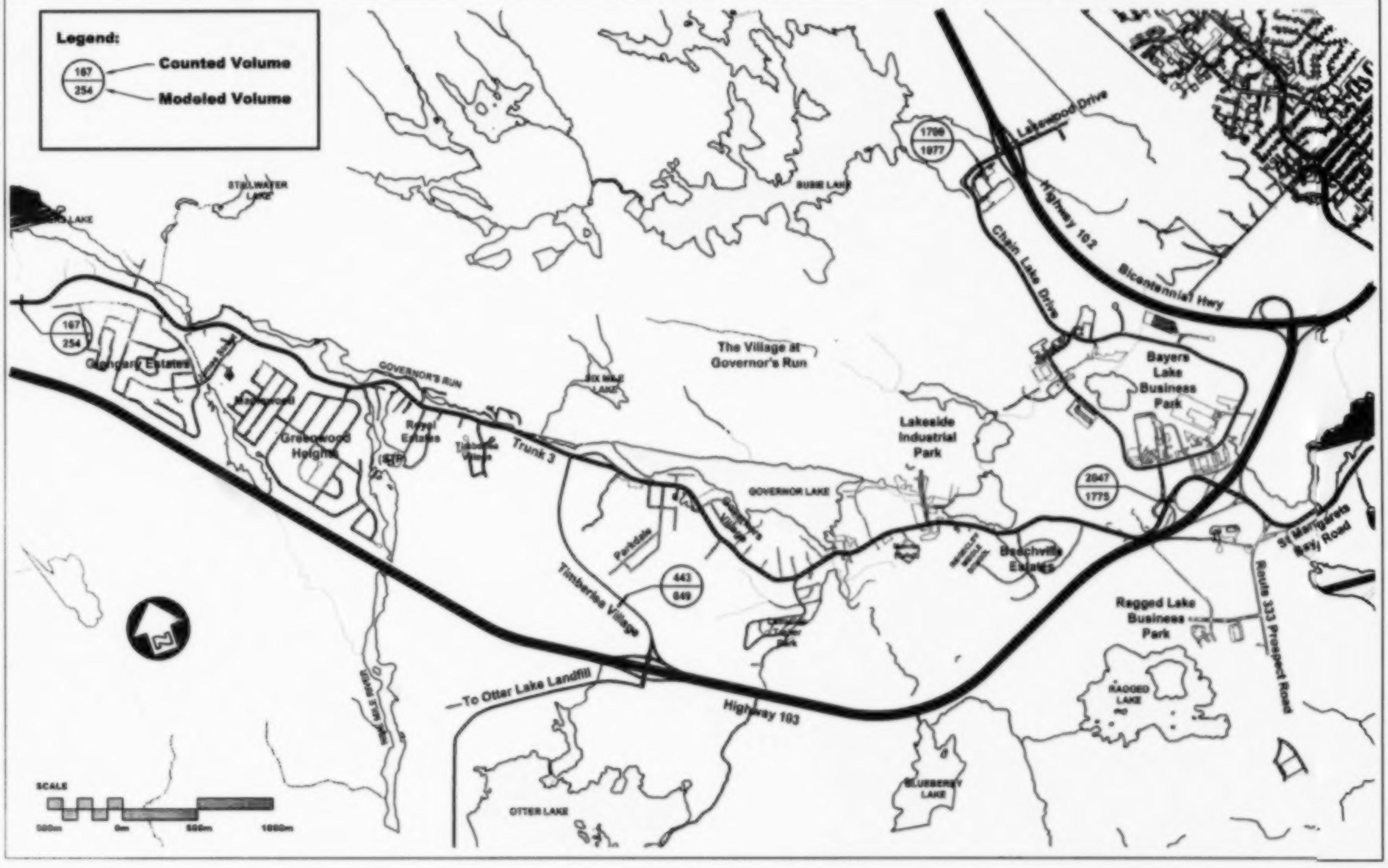
Governor's Lake Area Transportation Study

BEECHVILLE - LAKESIDE - TIMBERLEA

Title: *Exhibit 4.1*

Observed vs Modeled Volumes

SGE Acres


Legend:
167 / 254
Counted Volume
Modeled Volume
STILLWATER LAKE
LAKE
167 / 254
Glengary Estates
GOVERNOR'S RUN
Greenwood Heights
Royal Estates
Trunk 3
SIX MILE LAKE
The Village at Governor's Run
SUSIE LAKE
1709 / 1977
Lakewood Drive
Highway 102
Chain Lake Drive
Bicentennial Hwy
Bayers Lake Business Park
Lakeside Industrial Park
GOVERNOR LAKE
Parkdale
443 / 849
Timberlea Village
2047 / 1775
Beechville Estates
St Margarets Bay Road
Route 333 Prospect Road
Ragged Lake Business Park
RAGGED LAKE
To Otter Lake Landfill
Highway 103
BLUEBERRY LAKE
OTTER LAKE
N
SCALE
500m
0m
500m
1000m

configurations, intersection traffic control and signal timing plans. With this information, a level of service analysis could be conducted at the intersections in the Study Area along with a simulation of traffic operations during the AM Peak and PM Peak analysis periods.

4.2.1 AM Peak

During the AM Peak analysis period, one unsignalized intersection has a critical movement with a Level of Service below D, the Trunk 3/Highway 103 eastbound off-ramp intersection. At this location, the left turn from the off-ramp has a delay of 121 (rounded) seconds per vehicle. Signalization of this location is planned for implementation by Transportation and Public Works.

4.2.2 PM Peak

During the PM Peak analysis period, three unsignalized intersections have critical movements that operate at LOS E to F. These intersections are discussed below.

- Trunk 3 at Timberlea Village Parkway – The left turn from Timberlea Village Parkway onto Trunk 3 operates at a LOS E during the PM peak with 48 seconds of delay per vehicle.
- Trunk 3 at Highway 103 eastbound off ramp – The left turn movement from the off-ramp onto Trunk 3 operates at a LOS F in the PM peak period. As discussed above, signalization is planned at this location.
- Chain Lake Drive at Lakelands Boulevard – The overall intersection operates at a LOS F in the PM Peak with Levels of Service of E and F and approach delays of 39 seconds and 185 seconds on the westbound and eastbound approaches respectively. On the eastbound approach, the right hand turn movement from Chain Lake Drive to Lakelands Boulevard has over 190 seconds of delay/vehicle. The westbound left turn movement from Chain Lake Drive onto Lakelands Boulevard has a delay of over 40 seconds/vehicle.

The signalized intersection of Trunk 3 at Route 333 operates with an overall LOS E and overall volume-to-capacity ratio of 1.25 and average delay of 75 seconds/vehicle in the PM Peak. A key issue at this intersection is the left-turn movement from Trunk 3 onto Route 333. This movement operates at a LOS F with a delay of 273 seconds/vehicle. This causes the westbound Trunk 3 approach at this intersection to operate at a LOS F with an approach delay of 113 seconds/vehicle.

4.3 Current Access Capacity

Given that roadway system operations generally function with acceptable levels of service, it was decided to review the current access capacity to the Study Area from the adjacent Provincial Highway Network. Access capacity is defined as those critical locations in the network, which restrict vehicle access to the arterial highway or roadways outside the study area. Exhibit 4.2 presents the locations, the description of the available lanes, the estimated capacity of the present access point and the current and future traffic volumes. The entrance and exit points where the access capacity to the Study Area was reviewed are shown in Exhibit 4.3. Given that the study area is currently estimated to offer only 5,400 vph of access capacity and that forecasted volumes show deficiencies at three locations, it is anticipated that improved access and egress from the study area will be a future requirement.

Exhibit 4.2 *Access Capacity: Existing and Future Demand*

Access Location	Number of Lanes	Estimate of Present Capacity (In/Out)[1]	Present Volumes (vph)	Future Volumes (vph)	Comments
Lacewood Drive west of Highway 102 interchange	2 in / 2 out	1800 vph	AM Out 290 PM In 920	AM Out 2,800 (3 lanes) PM In 2,800 (3 lanes)	Capacity of signalized intersection
Trunk 3/Lakelands Boulevard/Highway 103 Interchange (Exit 2)	2 in / 2 out	1800 vph	AM Out 650 PM In 435	AM Out 2,800 (3 lanes) PM In 2,800 (3 lanes)	Trunk 3 Connectivity; Intersection Capacity
Timberlea Village Parkway North of Highway 103 interchange	1 in / 1 out	900 vph	AM Out 390 PM In 335	AM Out 1,800 (2 lanes) PM In 1,500 (2 lanes)	Commercial Development Access; Future Signalized Intersections; Highway 103 Access Ramps
Trunk 3 / Highway 103 interchange (Exit 4)	1 in / 1 out	1500 vph	AM Out 90 PM In 60	AM Out 420 (1 lane) PM In 420 (1 lane)	
Total	**6 in / 6 out**	**4200 vph**	**AM Out 1,420** **PM In 1,750**	**AM Out 7,820 (9 lanes)** **PM In 7,520 (9 lanes)**	

1. Lane capacity lane at an signalized intersection was assumed to be 900 vph and capacity of an unsignalized exclusive through lane was assumed to be 1,800 vph.

4.4 Collisions

As a precursor of operational problems, Nova Scotia Department of Transportation and Public Works collision data from 1996 to 2002 was examined. A detailed analysis of all collisions occurring in this time frame is provided in Appendix F.

Since 1996, there has been an upward trend in the number of collisions due mainly to an increase in overall traffic volumes in the study area. Some of the detailed findings of the analysis include:

- The number of collisions at intersections tends to increase during the morning and afternoon peak periods, reflecting the role of the majority of key Study Area roadways as commuter routes.
- Incidents on highway sections tend to be single vehicle accidents influenced by weather conditions.
- Recommended geometric and traffic control improvements at intersection locations experiencing a high number of collisions are a means to reduce their potential.

Insert Exhibit 4.3 Map showing Study Area access locations

EXHIBIT 4.3
ACCESS CAPACITY LOCATIONS

SGE Acres

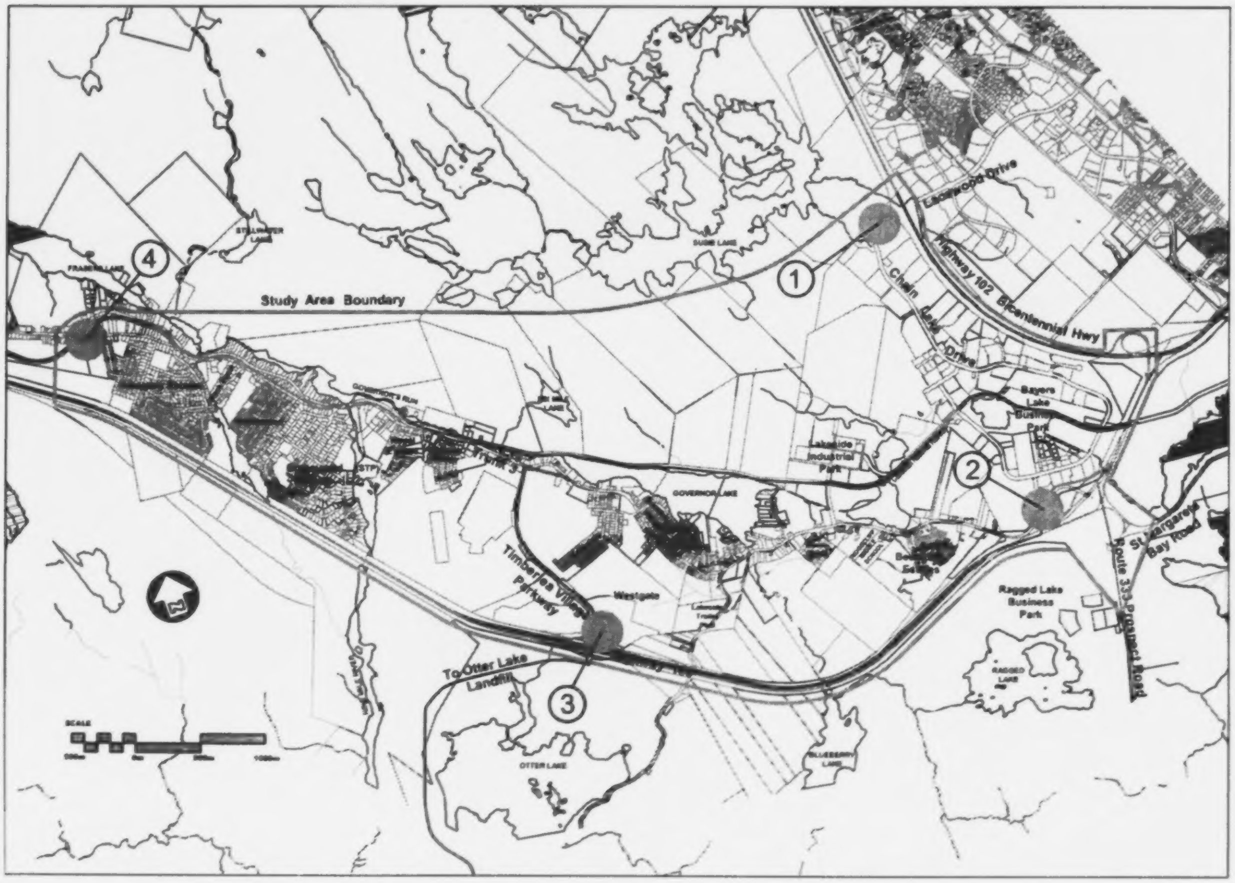
Lengend:

① Lacewood Drive West of Highway 102 Interchange

② Trunk 3 / Lakelands Blvd./ Highway 103 Interchange

③ Timberlea Village Parkway North of Highway 103 Interchange

④ Trunk 3 / Highway 103 Interchange (Exit 4)


Stillwater Lake
Fraser Lake
④
Study Area Boundary
Governor's Run
Trunk 3
STP
Timberlea Village Parkway
Westgate
To Otter Lake Landfill
③
Otter Lake
Scale
Lacewood Drive
①
Highway 102 Bicentennial Hwy
Chain Lake Drive
Bayers Lake Business Park
Lakeside Industrial Park
②
Governor Lake
Ragged Lake Business Park
Ragged Lake
Route 333 Prospect Road
St. Margarets Bay Road
Blueberry Lake

● **ACCESS POINTS**

V Future Roadway System Planning

5.1 Introduction

Planning of the future roadway system for the Study Area was the basis for the identification of the roadway network improvement options. This focused on three major areas as follows:

- A review of the internal roadway collector system including roadways proposed by development proponents and improvement initiatives currently on the books and proposed in earlier studies (Section 5.2).
- A review of the impacts on the connections to the arterial highways. This involved an analysis of the implications of the build out of planned future development (Section 5.3).
- A review of the capacity of the roadway connections between the Study Area and Peninsular Halifax (Section 5.4).

The planning analysis summarized above provided a means of identifying future roadway improvement options. Once these options were identified, they were evaluated to arrive at a recommended roadway improvement package. A functional plan was then prepared for the improvement package. As such, the analysis did not initially focus on the detailed operations and issues such as level of service for intersections in the Study Area, as this was addressed in the operational planning of the preferred option in Section 6.0.

5.1.1 Build Out Analysis – The Impact of Doing Nothing

To determine the impacts of traffic growth from future development on the existing Study Area transportation network, and better understand the urgency associated with system investment, the impacts of additional traffic loading on the existing system were analysed. This was accomplished through examining the percentage increase in traffic that would result with completion of portions of the proposed development. The transportation network developed with the Synchro model was then utilized to determine the operational impacts of these increased traffic volumes on the existing network.

While it is understood that the network configuration will change over the years, the key outputs of this analysis were an indication of where operational problems would be observed on the existing transportation network and when these operational problems would be evident. The analysis was accomplished as follows:

- The additional traffic volumes that would be generated were determined for various percentages of the total build out.
- The percentage increase in traffic volumes was then applied to the existing traffic volumes in the Synchro model for the AM and PM Peak periods. This allowed for the overall Performance Index for the Study Area Roadway network to be determined.

The Performance Index (PI) is a Measure of Effectiveness (MOE) that combines the consideration of delays, stops and queuing. Synchro calculates the PI with the following formula:

$$PI = \frac{D + 10St + 100QP}{3600}$$

PI = Performance Index
D = Percentile Signal Delay (s)
QP = Queue Penalty (vehicles affected)
St = Vehicle Stops (vph).

Lower Performance Index values indicate a network with lower levels of vehicle delay, stops and queuing. Higher values are obtained for networks with increased levels of delay and congestion. Performance Index values for various levels of build out are provided in Appendix E and shown graphically in Exhibit 5.1.

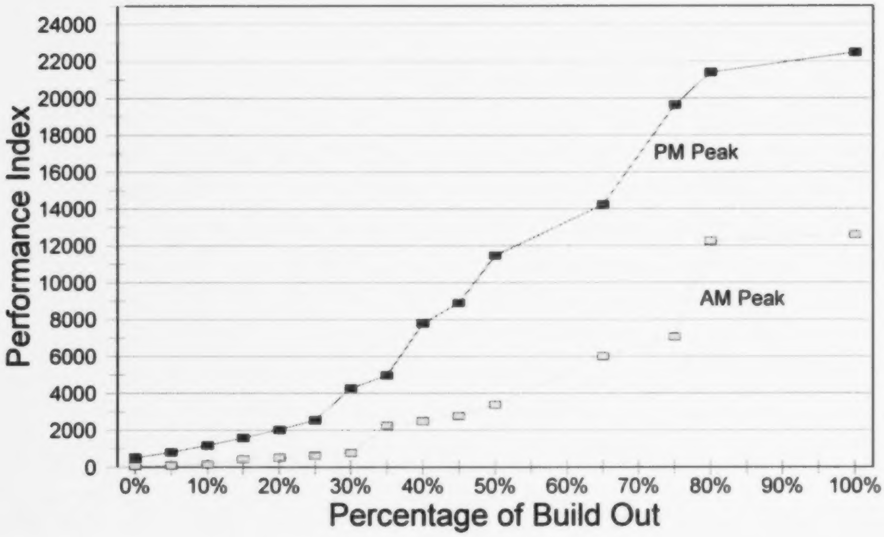


Exhibit 5.1 Performance Index/Percentage Build Out Relationship

As the level of future development increases, the rate of change of the overall performance of the network will also change. The slope of the Performance Index-Build out function shows this variability in the rate of change. Increases in the rate of change of the PI, are apparent after the 25% and 35% build out thresholds for the PM Peak Period and the 30% build out threshold for the AM Peak period.

The levels of development for the corresponding percentages of build out are as follows:

25% Build out: development of 50 acres of industrial lands
construction of 2,300 dwelling units
completion of 62,000 square feet of retail space.

50% Build out: development of 99 acres of industrial lands
construction of 4,600 dwelling units
completion of 123,600 square feet of retail space.

75% Build out: development of 148 acres of industrial lands
construction of 6,440 dwelling units
completion of 185,000 square feet of retail space.

Impacts at intersections in the study area were also reviewed by noting intersection approaches where the approach LOS decreases to LOS F with the increased build out. These locations are noted in Exhibit 5.2.

Based on this assessment, the proposed developments will necessitate improvements to the area's transportation network. Impacts of additional traffic on the Performance Index for the Study Area roadway network have shown that operational issues will begin to become evident after 35% to 40% of the proposed additional development occurs if improvements are not made earlier.

5.2 Creating a New Internal Roadway System

The future internal roadway networks in the proposed developments were assessed. This network consisted of both the roadway hierarchy proposed by the developers and improvements to the roadway network proposed by SGE Acres as a result of this analysis. The general assessment that was undertaken considered issues such as: street hierarchy, functionality, design requirements, capacity, linkages between developments and traffic volumes. Overall, the goal was to ensure that the proposed roadway network accomplishes the following:

- Supports intrazonal trips
- Supports future development
- Increases and manages access capacity to the study area
- Reduces traffic demand on Trunk 3
- Supports travel desire lines.

A strategic planning approach was utilized to develop a preferred network for modelling and is summarized in Exhibit 5.3. In this approach, two questions were asked in developing the roadway network:

- What are the strategic goals of each network element, existing and proposed?
- Are these goals consistent with the network criteria set out above?

Insert Exhibit 5.2 –Forecast Traffic Problem Areas

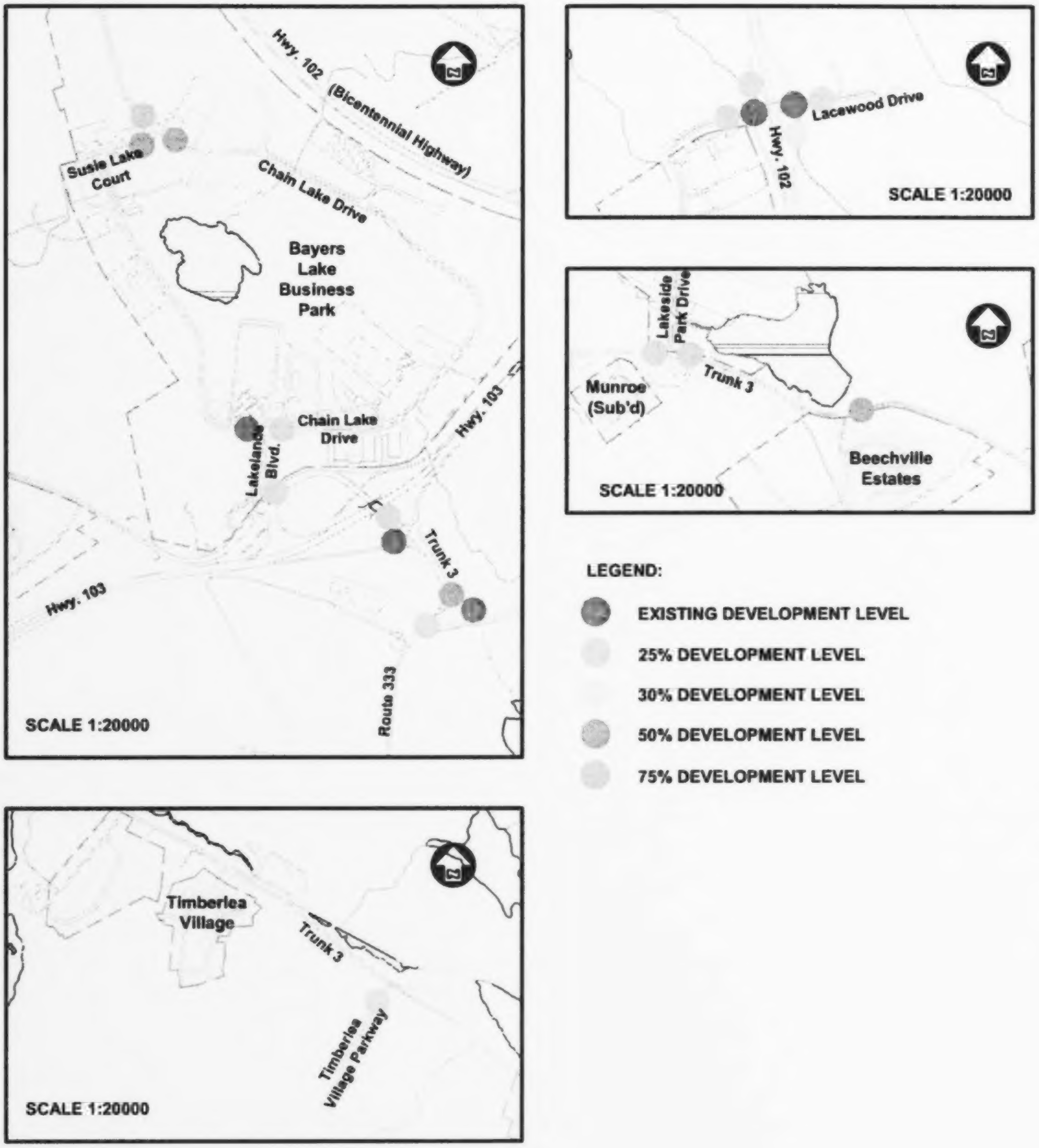

Hwy. 102 (Bicentennial Highway)
Susie Lake Court
Chain Lake Drive
Bayers Lake Business Park
Chain Lake Drive
Hwy. 103
Lakelands Blvd.
Trunk 3
Hwy. 103
Route 333
SCALE 1:20000
Lacewood Drive
Hwy. 102
SCALE 1:20000
Lakeside Park Drive
Trunk 3
Munroe (Sub'd)
Beechville Estates
SCALE 1:20000
Timberlea Village
Trunk 3
Timberlea Village Parkway
SCALE 1:20000
LEGEND:
● EXISTING DEVELOPMENT LEVEL
● 25% DEVELOPMENT LEVEL
● 30% DEVELOPMENT LEVEL
● 50% DEVELOPMENT LEVEL
● 75% DEVELOPMENT LEVEL

Exhibit 5.2

FORECASTED TRAFFIC PROBLEM AREAS
(LEVEL OF SERVICE F)

SGE Acres

Exhibit 5.3 - Internal Network Evaluation

Element	***Strategic Goal***	***Network Criteria***				
		Support intrazonal trips	Support future development	Increase and manage access capacity to the study area	Downplay the demand for Trunk 3	Support Travel desire lines
Widen Timberlea Village Parkway to 4 lanes	Accommodate New Development Ease pressure on Trunk 3	No	Yes	Yes	Yes	Yes
East Connector	Facilitate New Development	Yes	Yes	Yes	Yes	Yes
Lacewood Extension	Accommodate New Development Link Timberlea / Clayton Park	Yes	No	Yes	Yes	No
Governor Village Collector Roads	Secondary Access	Yes	Yes	Yes	Yes	Yes
Washmill Extension	Distribute traffic from Lacewood	No	Yes	Yes	Yes	Yes
Circular connector between Bayers lake Business Park, Lakeside Industrial Park and Governors Village (extension of Susie Lake Crescent)	Access Governor Lake Expand Business Park Link Bayers Lake/Lakeside Parks	Yes	Yes	N/A	Yes	Yes
Strategic additions to road network in Bayers Lake Business Park	Expand Business Park Distribute traffic	Yes	Yes	Yes	N/A	Yes
Linkage Between Bayers Lake and Ragged Lake Business Parks	Provide roadway linkage between business parks	Yes	Yes	Yes	Yes	Yes

The exhibit illustrates strong benefits from all of the proposed network elements except the Lacewood Extension. This element is deficient principally in that it fails to address the travel desire line and support of development criteria. The key home to work desire line, as identified in Section 3, is eastward toward Halifax Peninsula, not to the north. The Lacewood Extension would provide a direct linkage between the Clayton Park area and Lakeside-Timberlea and potential shortcutting along Highway 102 and Highway 103. However, the linkage would mainly serve limited numbers of non-work trips such as shopping trips. It would provide limited opportunities for new land development as it passes adjacent to public parkland.

Based on this evaluation, the identified internal network elements for further evaluation are listed below and illustrated in Exhibit 5.4.

- Widen Timberlea Village Parkway to 4 lanes
- Construct East Connector when required
- Construct Governor Village Collector Roads aligned with desire lines
- Build circular connector between Bayers lake Business Park, Lakeside Industrial Park and Governors Village (extension of Susie Lake Crescent) to serve both business and residential traffic.
- Provide a linkage between the Bayers Lake and Ragged Lake Business Parks.
- Provide strategic additions to road network in Bayers lake Business Park to distribute traffic on existing network.

Insert Exhibit 5.4 –Modelled Network.

Project:

Governor's Lake Area Transportation Study

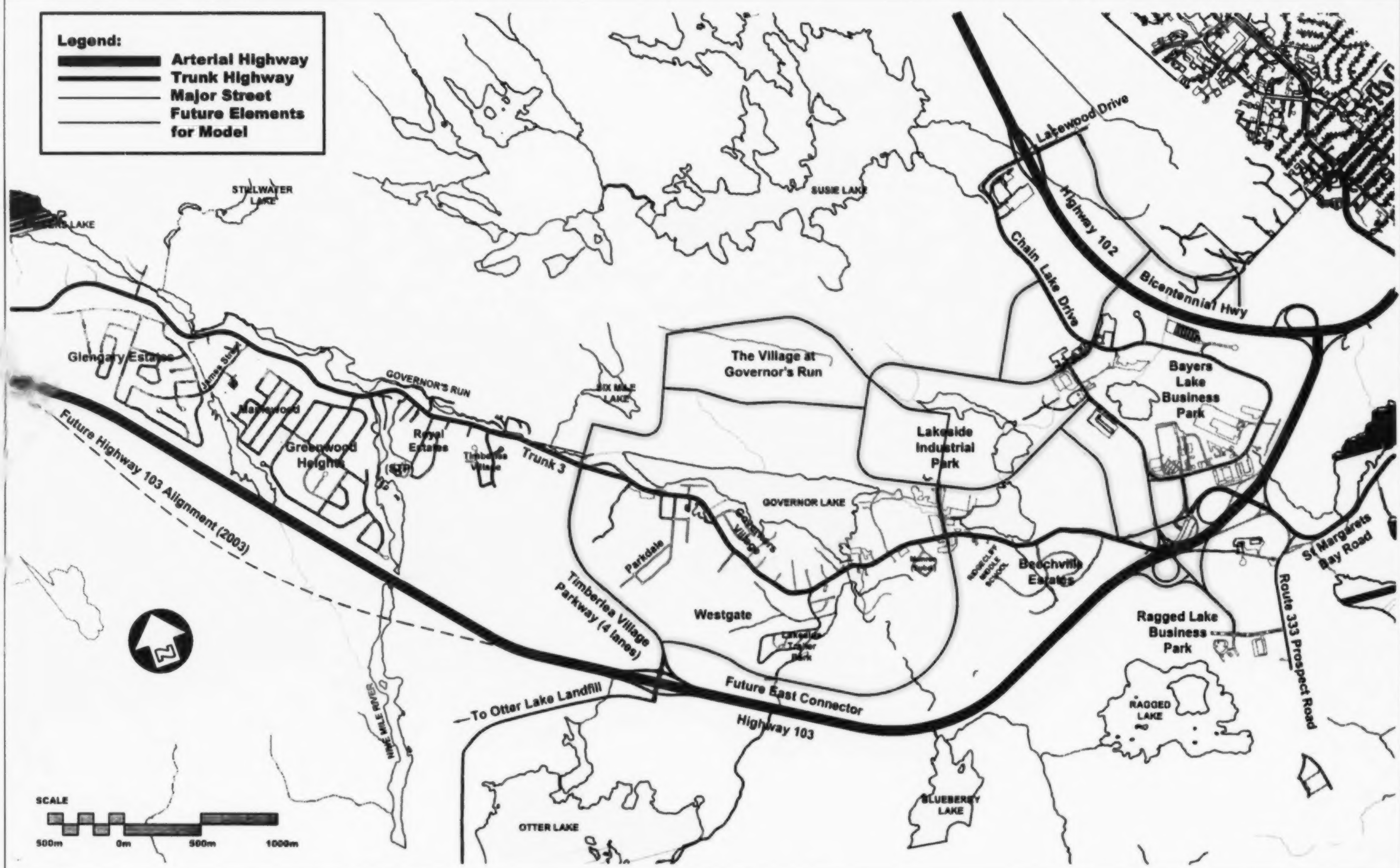
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 5.4

Modeled Network

SGE Acres


Legend:
Arterial Highway
Trunk Highway
Major Street
Future Elements for Model
STILLWATER LAKE
SUSIE LAKE
Lacewood Drive
Highway 102
Chain Lake Drive
Bicentennial Hwy
Glengary Estates
James Street
GOVERNOR'S RUN
SIX MILE LAKE
Greenwood Heights
Royal Estates
Timberlea Village
Trunk 3
The Village at Governor's Run
Lakeside Industrial Park
Bayers Lake Business Park
GOVERNOR LAKE
Governor's Village
Parkdale
Westgate
Lakeside Trailer Park
Ridgecliff Middle School
Beechville Estates
St Margarets Bay Road
Route 333 Prospect Road
Ragged Lake Business Park
RAGGED LAKE
Timberlea Village Parkway (4 lanes)
Future Highway 103 Alignment (2003)
To Otter Lake Landfill
Future East Connector
Highway 103
NINE MILE RIVER
OTTER LAKE
BLUEBERRY LAKE
N
SCALE
500m
0m
500m
1000m

In addition to the roadway network improvements listed above, SGE Acres reviewed current development plans for the roadway network in the Governor's Run and Westgate Developments with respect to issues such as volumes and connectivity.

The Village at Governor's Run – The proposed street hierarchy appears to be effective in distributing traffic. Through traffic volumes on the east-west roadway in Governor's Run will be reduced allowing it to function in more of a minor collector role, by the proposed roadway shown in Exhibit 5.2 passing through Lakeside Industrial Park and extending to the north of the Governor's Run development.

Projected intersection approach volumes were reviewed for the AM Peak and PM peak analysis periods based on volumes obtained from the QRS II model. Based on this review, the maximum total intersection approach volume in either of the AM Peak or PM Peak hours will be 2000 vehicles per hour.

In developing the western portions of Governor's Run and the Kimberly Lloyd lands further to the west, the provision of a secondary access should be examined and provided to ensure that an alternate access point exists.

Westgate - The Timberlea Village Parkway will serve the majority of traffic from this development. Some traffic will also access the existing roadway network via the proposed connections to the Royal Estates and Parkdale areas or the East Connector. In the future, as the construction of this development progresses and reaches full build out, signalization of the intersections of the collector roadways and the Timberlea Village Parkway should be planned for.

Based on this assessment of the proposed internal roadway networks in the two developments, the roadway layout provided by the proponents was included as shown in the modelled network in Exhibit 5.4.

5.3 Planning the Connections to the Arterial Roadway System

The second component of the analysis was the examination of the roadway linkages between the Study Area and the arterial roadway network. Proposed roadway improvements had to meet several planning level evaluation criteria including:

- ***Remedy existing capacity problems at Exit 2A:*** The diamond Lacewood Drive interchange and local approach roads are near capacity at certain periods of peak demand. While commitments have been made to upgrade the local network, full-scale redevelopment of the interchange appears too costly (and potentially unwarranted).

- ***Incorporate existing infrastructure assets where possible:*** Both the Municipality and the Province of Nova Scotia have made significant investments in the local and regional road network. Where possible, these investments should be utilized and new infrastructure should support them. Where this is not possible, attempts should be made to minimize the extent and cost of new investments.

- ***Increase and manage access capacity:*** The transportation model and previous studies have identified the need for up to three additional lanes to satisfy full build out travel demand, and because of the layout and intensity of development of Bayers Lake Business Park, the need for an new point of access has been identified.

- ***Reduce travel demand on Trunk 3:*** Without removing its current parallel function to Highway 103, it is considered prudent to downplay the importance of Trunk 3 for several reasons: the frequency of residential and business driveways that would be costly and disruptive to remove, the existing vertical and horizontal curvature which do not support high traffic volumes, the narrowness of the roadway and difficulty of widening (due to topography and adjacent development).

- ***Support travel desire lines:*** Strategic connections into and out of the study area should be placed in such a manner, and with the permissible movements, to address the key home-to-work travel desire lines. For the study area, the principal desire line is to and from Halifax Peninsula.

From the criteria provided above, the overall goal of the evaluation criteria is to develop increased access between existing and future developments in the Study Area and the arterial roadway system. This increased access must support existing and future travel demand while making efficient use of exiting infrastructure.

5.3.1 Increased Access Capacity

Access capacity for the study area was reviewed at the macro level. The analysis focused on determining the number of lanes that would be required to provide access to and from the study area for the existing peak hour traffic volumes and future peak hour volumes at full build out. The review of access capacity consisted of evaluating traffic volumes crossing a cordon line around the study area. This cordon line intersected the following routes at the following locations:

- Timberlea Village Parkway North of Highway 103 (1 lane in/1 lane out)
- Lacewood Drive west of Highway 102 (2 lanes in/2 lanes)*
- Trunk 3 west of Timberlea Village Parkway (1 lane in/1 lane out)
- Trunk 3 East of Lakelands Boulevard (2 lanes in/2 lanes out)

Based on the analysis presented in Exhibit 5.5, current peak hour entering and exiting volumes from the Study Area the number of lanes provided to the study area is adequate to meet current traffic volumes. Under full build out of the proposed developments, a total of 9 lanes will be required, which will necessitate the construction of three additional lanes to serve the study area based on total peak hour entering and exiting volumes. From the evaluation criteria discussed earlier in this section, four preferred access improvement options were identified, as described below. The options are not mutually exclusive.

---

* Note: In 2002/2003 Lacewood Drive was widened to eight lanes in the vicinity of the Bicentennial Highway ramps, but the approach capacity remained the same.

Exhibit 5.5 Access Capacity: Existing and Future Demand

Access Location	Existing Number of Lanes	Present Volumes (vph)	Future Volumes (vph)	Comments
Lacewood Drive west of Highway 102 interchange	2 in / 2 out	AM Out 290 – 1 lane PM In 920 - 1 lane	AM Out 2,800– 3 lanes PM In 2,800 – 3 lanes	Capacity of signalized intersection
Trunk 3/Lakelands Boulevard/Highway 103 Interchange	2 in / 2 out	AM Out 650 – 1 lane PM In 435 - 1 lane	AM Out 2,800 – 3 lanes PM In 2,800 – 3 lanes	Trunk 3 Connectivity; Intersection Capacity
Timberlea Village Parkway North of Highway 103 interchange (Exit 3)	1 in / 1 out	AM Out 390 – 1 lane PM In 335 - 1 lane	AM Out 1,800 – 2 lanes PM In 1,500 – 2 lanes	Commercial Development Access; Future Signalized Intersections: Highway 103 Access Ramps
Trunk 3 / Highway 103 interchange	1 in / 1 out	AM Out 90 – 1 lane PM In 60 – 1 lane	AM Out 420 – 1 lanes PM In 420 – 1 lanes	
Total	**6 in / 6 out**	**AM Out 1,420 – 4 lanes** **PM In 1,750 – 4 lanes**	**AM Out 7,820 – 9 lanes** **PM In 7,520 – 9 lanes**	

From the information presented above, three additional entrance and exit lanes must be provided in order to meet traffic demand at full build out of the proposed developments. Potential solutions for the development of these three additional lanes include the extension of improvements to the existing interchange at Exit 2, the extension of Washmill Court and the widening of the Timberlea Village Parkway.

Exit 2 Interchange Options: The interchange provides a key link between Highway 103 and the local network (Trunk 3, Route 333 and Lakelands Boulevard) but at present it is the centre of the most significant home-to-work travel constraints. Four options were developed to improve this interchange. Reconfiguration of the interchange would provide an additional 2 outbound lanes and 1 inbound lane of access capacity. The improvement options are discussed below in Section 5.3.1.1.

Extension of Washmill Lake Court: Extending Washmill Lake Court under Highway 102 to connect with the local collector system east of the highway was first presented in the *Bayers Lake Interchange Transportation Study* (March 1999). Our preliminary assessment also suggested that this option might also provide a new connection directly to the highway itself. The net result would be the provision of either 1 or 2 additional lanes of inbound and outbound capacity. Various connection options were modelled and a discussion of the results is presented below in Section 5.3.1.2.

Widening of Timberlea Village Parkway: This project, was a recommended improvement from the *Westgate Proposed Commercial Development Traffic Impact Analysis* (Delphi Analytics, 2000). Widening of the roadway would be completed by 2010 and provide an additional lane in each direction additional capacity for traffic from the Governor's Run and Westgate Developments to access Highway 103. This improvement is discussed in Section 5.3.1.3.

Widening of Lacewood Drive: This improvement, recommended in the *Bayers Lake Interchange Traffic Study* (ARTM/Beasy Nichol, March 1999), would see Lacewood Drive widened to provide three lanes in each direction through the Bayers Lake Interchange. This project is currently being constructed (December 2002) and will improve access capacity from the Study Area to Highway 102 through adding an additional lane through the interchange. This improvement is discussed in Section 5.3.1.4.

The planning team developed a network model to reflect the improvement options associated with the Highway 103 Exit 2 Interchange Improvements and the Washmill Lake Court Extension options. Trip generation and distribution for residential and commercial trips was prepared manually, with the QRS-II model employed to assign this traffic to the network and model roadway and interchange volumes.

A preliminary geometric analysis was carried out to determine the feasibility of the proposed improvements. The analysis has thus moved one step beyond planning to address actual feasibility of the solutions.

For the Susie Lake Crescent extension option, a preliminary vertical alignment assessment was also conducted to address concerns about cuts and fills in the area north of Black Duck Lake. The analysis revealed that a reasonable profile could be achieved without extremes in the amount of cuts and fills.

5.3.1.1 Exit 2 Interchange Options

Four options are illustrated in Exhibit 5.6. In addition to the criteria set out above, the following planning considerations were assessed in developing potential improvement options at the interchange:

- While it is important to support existing investments in roadway infrastructure, it is also important, at least conceptually to consider a complete redesign of the interchange. As such a clean slate option was reviewed.
- The interchange should provide an alternate route for a portion of the traffic utilizing the Highway 102/Lacewood Drive interchange. This would serve to ease capacity problems at the interchange.
- Provide connection across Highway 103: The interchange should, if possible, improve the connectivity between the Bayers Lake and Ragged Lake Business Parks.
- Connectivity between various roadways including Trunk 3 and St. Margaret's Bay Road and between Trunk 3 and Highway 103.
- Issues such as implementation costs and weaving conflicts were also reviewed.

Each of the four improvement options is discussed below.

Option 1: This option is an attempt to utilize the existing bridge infrastructure as a means of minimizing costs (as bridge structures are usually the most expensive components of an interchange). The concept utilizes the existing CN railway bridge located east of the present interchange. It is acknowledged that the railway is still in use. The major work is the creation of a new partial cloverleaf ramp that would provide access to Highway 103 westbound from the Bayers Lake Business Park. The concept also includes the realignment of Trunk 3.

Option 2: This option attempts to maximize the existing ramp and bridge infrastructure while still achieving the criteria set out above. It seeks to significantly downgrade Trunk 3 and reducing Bay Road east of the interchange to local/ Peggy's Cove traffic service.

Option 3: In this option part of the existing interchange would be retained, but a new overpass would be provided west of the current interchange to permit an extension of Chain Lake across Highway 103. The extension would connect with Long Lake Drive in Ragged Lake Business Park, and provide improved access and egress on Highway 103. Full function of Trunk 3 is retained but a portion of Trunk 3 to the west of the Lakelands Boulevard intersection would be realigned. Access to and from the new connector roadway between the Business Parks and Highway 103 would be provided by a reconfiguration of the access ramps.

Option 4: This option introduces a full cloverleaf interchange that would completely replace the existing interchange. The concept extends Chain Lake across Trunk 3 and Highway 103 and provides a new connection to Ragged Lake Business Park. Route 333 is realigned directly into Chain Lake Drive. Bay Road connects at right angles to the new crossing road.

Exhibit 5.6 Exit 2 Interchange Options

Project:

Governor's Lake Area Transportation Study

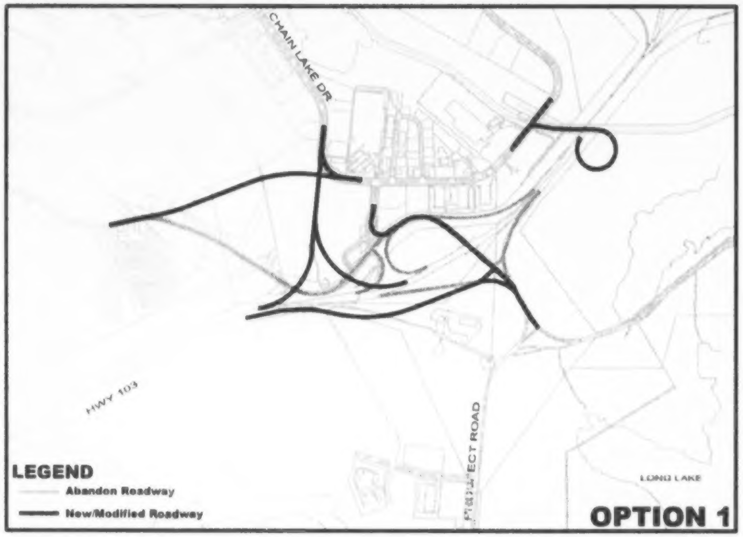
BEECHVILLE - LAKESIDE - TIMBERLEA

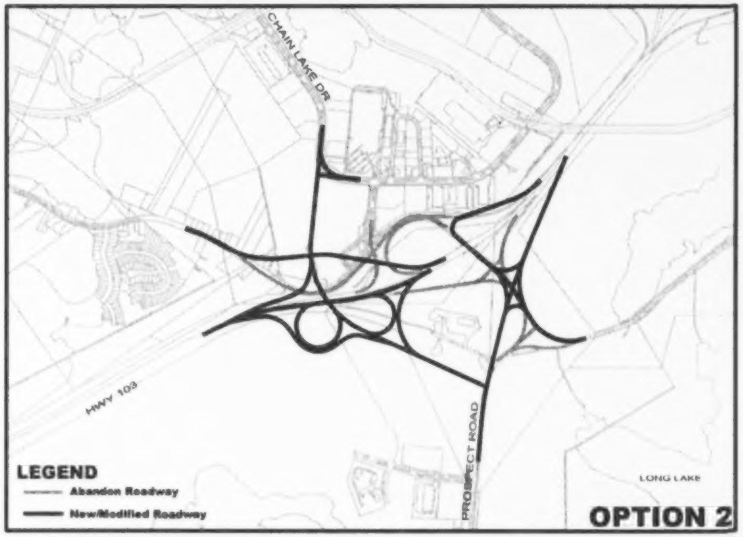
Title:

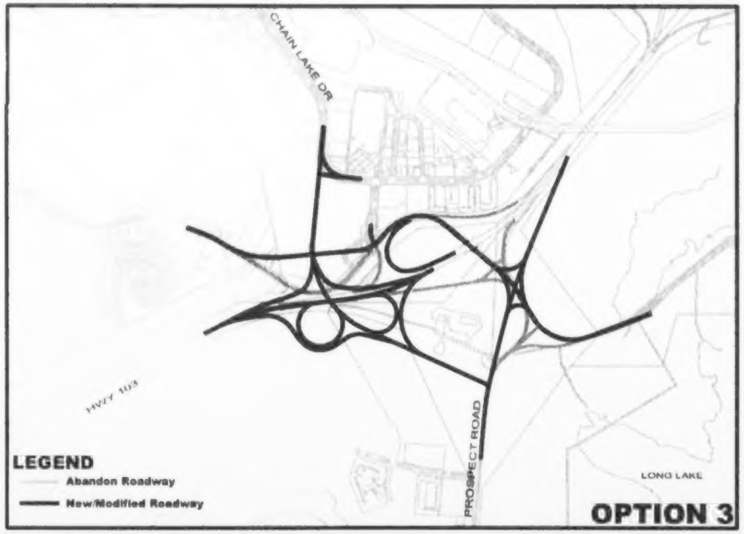
Exhibit 5.6

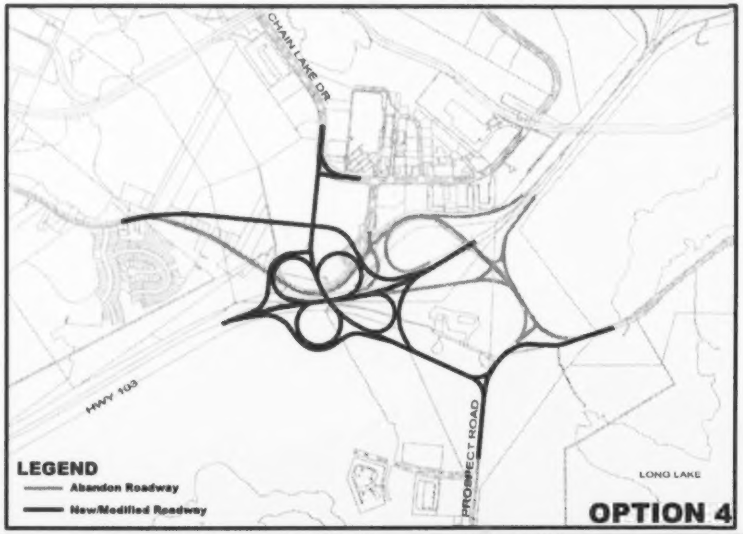
Exit 2 Interchange Options

SGE Acres


CHAIN LAKE DR
HWY 103
PROSPECT ROAD
LONG LAKE
LEGEND
Abandon Roadway
New/Modified Roadway
OPTION 1


CHAIN LAKE DR
HWY 103
PROSPECT ROAD
LONG LAKE
LEGEND
Abandon Roadway
New/Modified Roadway
OPTION 2


CHAIN LAKE DR
HWY 103
PROSPECT ROAD
LONG LAKE
LEGEND
Abandon Roadway
New/Modified Roadway
OPTION 3


CHAIN LAKE DR
HWY 103
PROSPECT ROAD
LONG LAKE
LEGEND
Abandon Roadway
New/Modified Roadway
OPTION 4

An evaluative matrix was developed to compare the four options and is provided in Exhibit 5.7 to assess their potential to meet key strategic and operational goals including improved connectivity, limit weaving conflict areas at the interchange. The matrix also considers order of magnitude cost ranking.

Exhibit 5.7 Interchange Options Evaluation

Strategic and Operational Goals	Option 1	Option 2	Option 3	Option 4
Maintain flow between Trunk 3 and St. Margaret's Bay Road	No	No	Yes	No
Maintain connectivity from Trunk 3 to Highway 103	Yes	Yes	No	Yes
Downplay connectivity from Hwy 103 to Trunk 3	Yes	No	Yes	No
Maintain connectivity between Trunk 3 to Highway 103	No	No	No	Yes
Improve connectivity between Bayers Lake and Ragged Lake Business Parks	No	Yes	Yes	Yes
Improve connectivity from Bayers Lake Business Park to and from Highway 103	Yes	Yes	Yes	Yes
Improve connectivity from Ragged Lake Business Park to and from Highway 103	No	Yes	Yes	Yes
Minimize weaving locations (Number of new weaving locations created)	0	1	1	2
Additional Access Lanes Provided	2 out/1 in	2 out/1 in	2 out/1 in	2 out/1 in
Implementation Costs (1 – Least Expensive; 4 - Most expensive)	1	2	3	4

Option 1: This concept was developed with a view to serving traffic better without the addition of major infrastructure. A component of the design has access from Bayers Lake Business Park to Highway 103 eastbound provided via the existing CN Rail underpass. As such, this option would require the involvement of CN Rail and would require abandonment of the existing Lakeside Industrial Park spur line.

The abandonment and realignment of a portion of Trunk 3 with Chain Lake Drive, has a negative impact on the flow and connectivity of Trunk 3 on either side of the Exit 2 interchange. Eastbound movements between Trunk 3 and Highway 103 would still be maintained via the alignment with Chain Lake Drive and a partial cloverleaf at the CN Rail underpass. As the lack of roadway connectivity to the Ragged Lake Business Park would remain unchanged, this option does not achieve the strategic goal of linking the Bayers Lake and Ragged Lake Business Parks. This Option is estimated as the least expensive of the four options, as no new bridge structures would be required.

Option 2: This Option results in the connectivity of Trunk 3 and St. Margaret's Bay Road being severed. Connectivity between Trunk 3 and Highway 103 for eastbound traffic remains but is not as strong as the existing case.

Traffic connectivity between Highway 103 westbound is maintained through a direct off ramp from Highway 103 linking into a realigned Trunk 3. This alignment may make Trunk 3 too attractive from a route choice perspective and not meet the desired goal of downplaying the Highway 103 to Trunk 3 westbound connection. The linkage between Trunk 3 and Highway 103 is negatively impacted, as there is no opportunity provided for traffic travelling westbound on Trunk 3 to access Highway 103 westbound without doubling back in the Bayers Lake Business Park.

Access to the area's Business Parks is improved over the existing case with a formal connection provided between the Ragged Lake and Bayers Lake Business Parks. Access between Highway 103 and the Bayers Lake Business Park is improved over the existing case through the movements permitted by the partial cloverleaf. Based on a preliminary review of costs, this option ranks as the second-least expensive.

Option 3: This option retains the full function of Trunk 3. The connectivity for eastbound traffic on Highway 103 to access Trunk 3 and continue eastbound is downplayed through the traffic having to exit Highway 103 and double back through the Bayers Lake Business Park and access Trunk 3 via Lakelands Boulevard. For westbound traffic on Trunk 3 to access Highway 103 westbound, the traffic would have to travel through the Ragged Lake Business Park via Route 333 and make a left turn at the interchange of Highway 103 and the new business park connector. The development of the linkage roadway between Ragged Lake Business Park and Bayers Lake Business Park along with the associated interchange will improve access between the business parks and their access to Highway 103. This option is the second most expensive.

Option 4: This option introduces a full cloverleaf interchange that would completely replace the existing interchange. As a result, this is the most expensive option. Direct connectivity between St. Margaret's Bay Road and Trunk 3 is not provided in this option, instead traffic must utilize Route 333 and the new connector road between the Business Parks to access Trunk 3 from St. Margaret's Bay Road. Connectivity between Highway 103 and Trunk 3 is maintained through the new interchange but the connectivity between Highway 103 and Trunk 3 is not downplayed. At the new interchange, there is an off-ramp from Highway 103 eastbound that provides a direct connection with Trunk 3 eastbound. As a result, this would increase the desire to travel via Trunk 3 to the western portions of the Study Area. As with Option 3, the development of the linkage roadway between Ragged Lake Business Park and Bayers Lake Business Park along with the new interchange will improve access between the business parks and their connection to Highway 103.

Based on the review above, Option 3 was selected as the preferred option. It meets five of the strategic goals outlined in Exhibit 5.7 at a lower cost than Option 4, the other option that addresses the same five strategic goals. The only weakness with Option 3 is that it does not maintain direct connectivity from and between Highway 103 and Trunk 3.

5.3.1.2 Washmill Lake Court Extension Options

Washmill Lake Court is a short street opposite Susie Lake Crescent at the intersection of Chain Lake Drive. A municipally owned corridor has been retained at the end of Washmill Lake Court to permit the extension this street to and under Highway 102. The extension, while costly, could provide a strategic new link between the Mainland North area of HRM and Bayers Lake Business Park as well as to points west of the business park. Modelling has indicated that this improvement will help to significantly reduce demands on Lacewood Drive, once connections to the local network are completed. It is expected, for example, that the network will eventually include a new connection south of Main Street on Northwest Arm Drive. This connection was modelled. In addition, the following other options were also modelled including a “do nothing option” which had no extension of Washmill Lake Court. These options are illustrated in Exhibit 5.8.

> ***Option A:*** Right-in right out ramps from Highway 102. This option was considered as a possible means of offering regional and peninsula-bound traffic with direct access to the arterial system.
>
> ***Option B:*** No access from Highway 102. This option was considered as a possible means of offering a connection to Mainland North and Peninsular Halifax only.
>
> ***Option C:*** An extension of Washmill Lake Court under Highway 102 through to Mainland North. An off ramp from Highway 102 Southbound and an on ramp to access Highway 102 Southbound will be provided.

The three options that were developed for the Washmill Lake Court Extension were evaluated with respect to their impacts on traffic volumes in the area during the AM Peak and PM Peak analysis periods. The volume data is provided in Exhibits 5.9 and 5.10.

INSERT EXHIBIT 5.8 – Washmill Court Extension Options

Project:

Governor's Lake Area Transportation Study

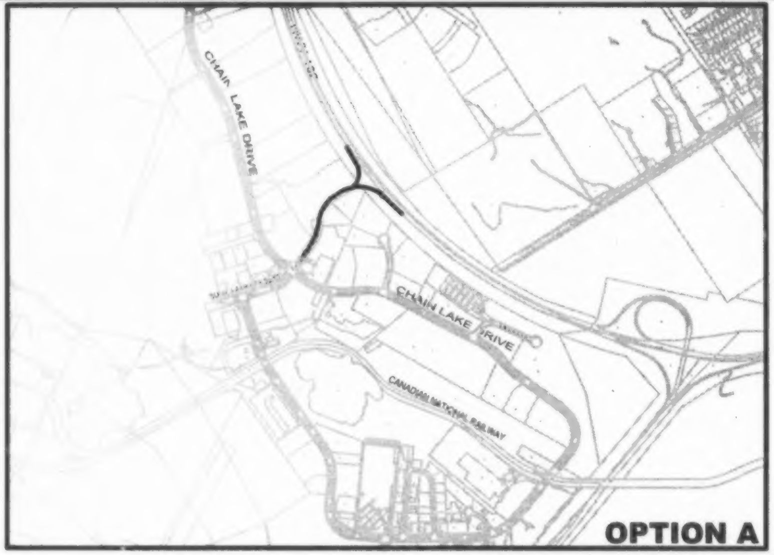
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

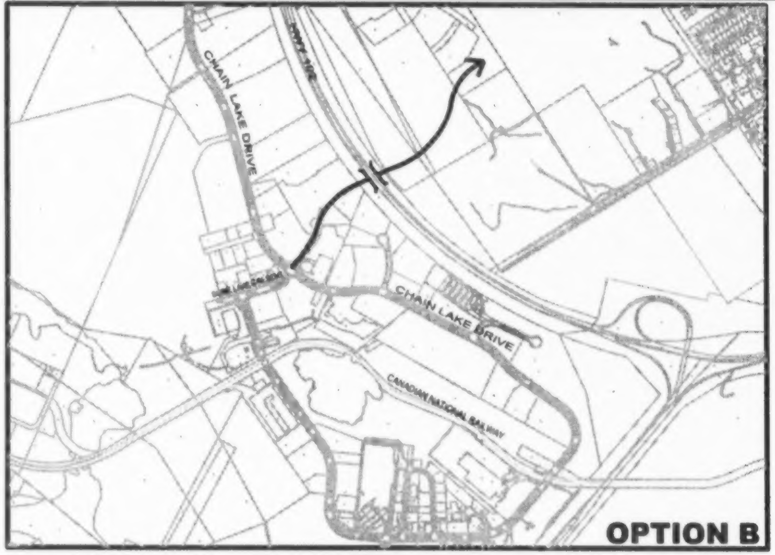
Exhibit 5.8

Washmill Lake Court Extension Options

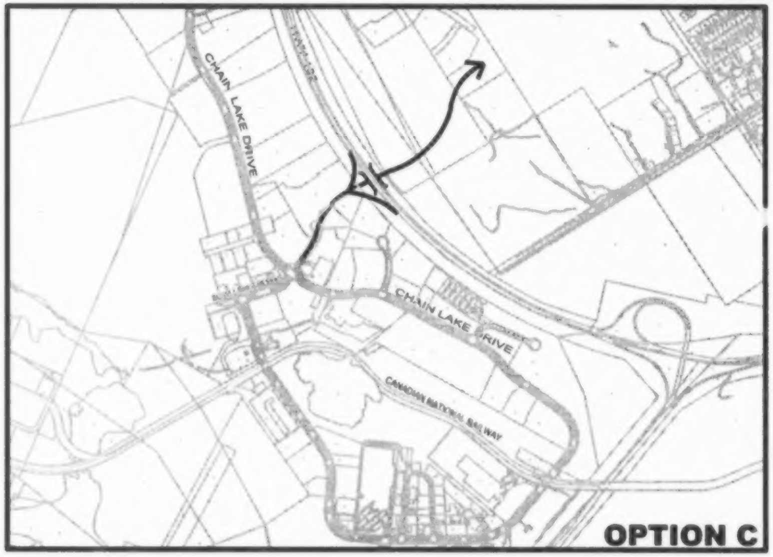
SGE Acres


CHAIN LAKE DRIVE
HWY 102
CHAIN LAKE DRIVE
CANADIAN NATIONAL RAILWAY

OPTION A


CHAIN LAKE DRIVE
HWY 102
CHAIN LAKE DRIVE
CANADIAN NATIONAL RAILWAY

OPTION B


CHAIN LAKE DRIVE
HWY 102
CHAIN LAKE DRIVE
CANADIAN NATIONAL RAILWAY

OPTION C

Exhibit 5.9 AM Peak Access Utilization Comparison

Location		Existing Conditions		Full Build-Out with Option 3 Interchange and Washmill Lake Court Alternatives							
				No Washmill Extension		Option A Hwy 102 SB On/Off Ramp		Option B Washmill Underpass		Option C Washmill Underpass w/ Hwy 102 SB On/Off Ramp	
		Trips	**Percent**	**Trips**	**Percent**	**Trips**	**Percent**	**Trips**	**Percent**	**Trips**	**Percent**
Lacewood Drive west of Hwy 102 On/Off Ramps	***Enter***	438		1385		797		1087		641	
	Exit	290		788		570		661		448	
	Total	728	28.0%	2173	22.5%	1367	14.1%	1748	18.5%	1089	11.1%
Washmill Lake Court west of Hwy 102 On/Off Ramps	***Enter***	–	–	–	–	794		912		1050	
	Exit	–	–	–	–	949		222		974	
	Total	–	–	–	–	1743	18.0%	1134	12.0%	2024	20.6%
SUBTOTAL		728	28.0%	2173	22.5%	3110	32.0%	2882	30.5%	3113	31.7%
Trunk 3/ Chain Lake Extension	***Enter***	613		2388		2147		1680		2121	
	Exit	585		1929		1522		1959		1524	
	Total	1198	46.1%	4317	44.8%	3669	37.8%	3639	38.5%	3645	37.1%
Timberlea Village Parkway north of Hwy 103	***Enter***	99		95		162		96		148	
	Exit	390		2304		2015		2088		2169	
	Total	489	18.8%	2399	24.9%	2177	22.4%	2184	23.1%	2317	23.6%
Trunk 3 west of Glengarry Estates	***Enter***	100		308		308		308		308	
	Exit	83		443		443		443		443	
	Total	183	7.0%	751	7.8%	751	7.7%	751	7.9%	751	7.6%

Exhibit 5.10 PM Peak Access Utilization Comparison

Location		Existing Conditions		Full Build-Out with Option 3 Interchange and Washmill Lake Court Alternatives							
				No Washmill Extension		Option A Hwy 102 SB On/Off Ramp		Option B Washmill Underpass		Option C Washmill Underpass w/ Hwy 102 SB On/Off Ramp	
		Trips	**Percent**	**Trips**	**Percent**	**Trips**	**Percent**	**Trips**	**Percent**	**Trips**	**Percent**
Lacewood Drive west of Hwy 102 On/Off Ramps	***Enter***	920		1,841		1,243		1,312		777	
	Exit	789		1,411		1,118		1,519		1,260	
	Total	1,709	39.1%	3,252	27.0%	2,361	19.5%	2,831	23.8%	2,037	17.1%
Washmill Lake Court west of Hwy 102 On/Off Ramps	***Enter***	–	–	–	–	899		1815		2,185	
	Exit	–	–	–	–	993		102		1,138	
	Total	–	–	–	–	1,892	15.6%	1,917	16.1%	3,323	27.9%
SUBTOTAL		1,709	39.1%	3,252	27.0%	4,253	35.2%	4,748	39.9%	5,360	44.9%
Trunk 3/ Chain Lake Extension	***Enter***	890		2,610		2,357		1,256		1,434	
	Exit	1,157		2,632		2,124		2,491		1,849	
	Total	2,047	46.9%	5,242	43.5%	4,481	37.0%	3,747	31.5%	3,283	27.5%
Timberlea Parkway North of Hwy 103	***Enter***	334		1,424		1,403		1,426		1,422	
	Exit	109		1,298		1,133		1,164		1,036	
	Total	443	10.1%	2,722	22.6%	2,536	21.0%	2,590	21.7%	2,458	20.6%
Trunk 3 west of Glengarry Estates	***Enter***	56		449		449		449		449	
	Exit	111		379		379		379		379	
	Total	167	3.8%	828	6.9%	828	6.8%	828	7.0%	828	6.9%

Based on the information shown in Exhibits 5.9 and 5.10, the options have the same general effect during the AM Peak and PM Peak analysis periods. Implementation of either of the options will reduce the proportion of traffic on Lacewood Drive with the proposed Washmill Lake Court Extension handling between 12% and 21% of the Study Area traffic in the AM Peak and 15% to 28% of the Study Area Traffic in the PM Peak. The proportion of traffic accessing the Study Area via Trunk 3 is also reduced. The impacts of the three options are discussed below.

> ***Option A:*** Of the three options, this option has the second highest volumes on Lacewood Drive and generally the second highest volumes on the Washmill Lake Court extension. It also has the higher volumes on Trunk 3 in the PM Peak than the other 2 options.
>
> ***Option B:*** Of the three options, this option has the highest volumes on Lacewood Drive, but has lower volumes than the existing and future do nothing cases. This option provides greater calming of Trunk 3 in the PM Peak than

Option A, although the proportion of traffic on Trunk 3 in the AM Peak is generally the same as the other Options. As there are no accompanying ramps to be built to access Highway 102, this Option would have the lowest cost.

Option C: This option has the highest volumes on Washmill Lake Court and the lowest on Lacewood Drive. When the volumes on Lacewood Drive and Washmill Lake Court are combined, this option also has the highest volume utilizing those two roadways. Volumes on Trunk 3 are the lowest of all of the three options.

As the three options generally have the same net effect with respect to the overall proportion of traffic utilizing the access points, either of the three will have the same net effect on overall traffic patterns. With respect to traffic volumes and the impacts on the any proposed development in the Mainland North or South area, Option B has the lowest volumes during the AM Peak analysis period and the second lowest during the PM Peak, and as a result does not provide a high level of through traffic in the area. **This factor combined with the potential for the lowest cost, made Option B the preferred Option.**

The extension of Washmill Court will provide either one or two lane capacity in each direction, depending on the cross-section selected for the final design. The overall strategic goals of the improvement will be to provide additional access to the Study Area while distributing traffic from Lacewood Drive. Through the provision of additional access and providing a linkage to the Mainland North area, it supports new development both inside and outside the Study Area. Demand for Trunk 3 will be decreased when the Washmill Court Extension, in conjunction with the proposed connector roadways between the Governor's Run Development and the Bayers Lake Business Park, is constructed.

5.3.1.3 Widening of Timberlea Village Parkway

As per the recommendations contained in the *Westgate Proposed Commercial Development Traffic Impact Analysis* (Delphi Analytics, 2000), the improvement package included a four lane cross section on the Timberlea Village Parkway. In addition, there will be a requirement for improvements to the Highway 103/Timberlea Village Parkway interchange to increase the capacity for southbound traffic on the Timberlea Village Parkway to access Highway 103 Eastbound. Improvements will also be required to improve the flow of traffic and reduce vehicle conflicts for traffic at the intersection of the public road serving the proposed Westgate retail area (including Sobeys) and the Timberlea Village Parkway.

5.3.1.4 Widening of Lacewood Drive

Roadway network improvements also included the improvements at the Lacewood Drive/Highway 102 Interchange that are currently under construction. These improvements include a widening of Lacewood Drive to three lanes in each direction through the interchange.

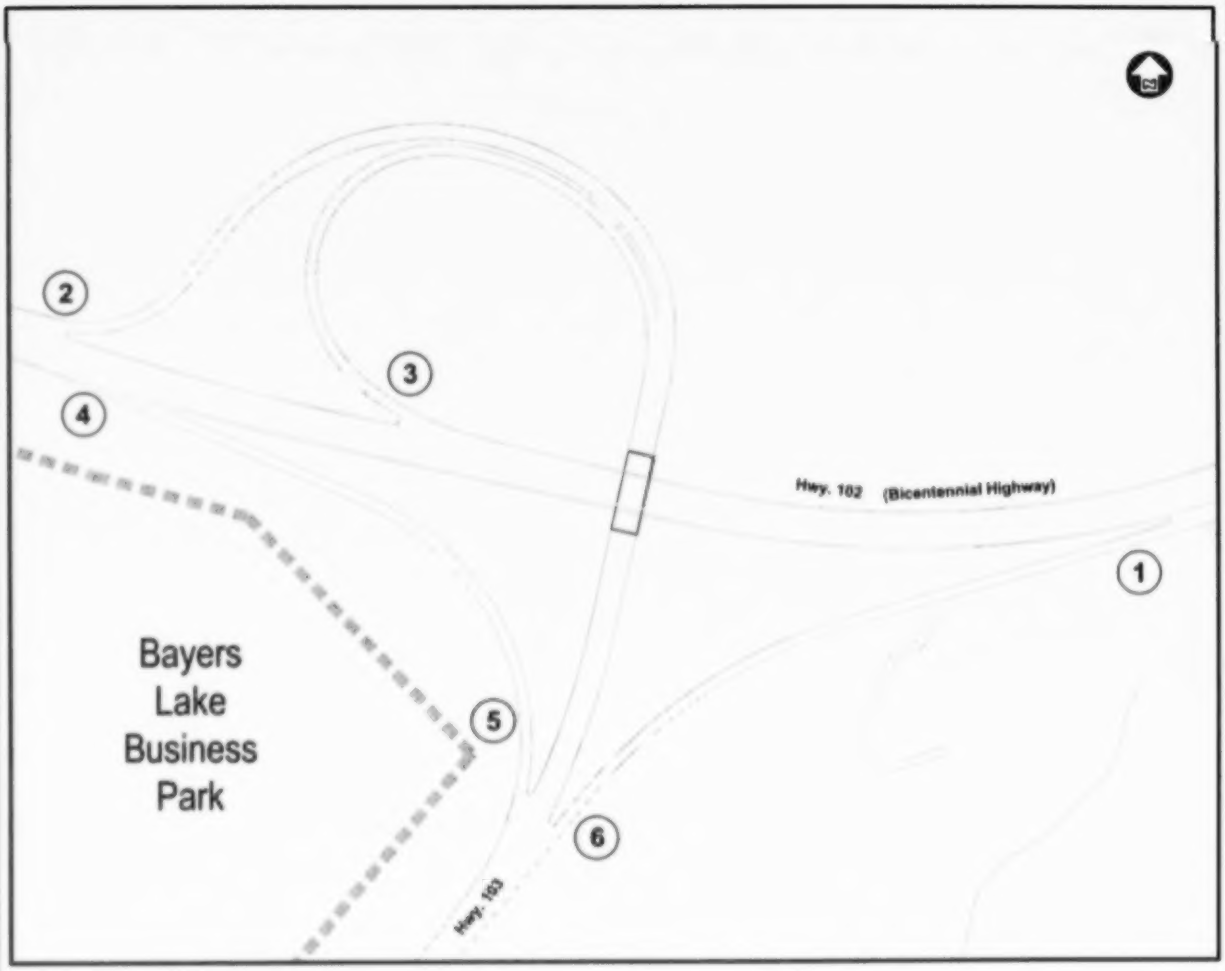
5.3.1.5 Highway 102/Highway 103 Interchange

The operations of the ramp junctions at the Highway 102/Highway 103 interchange were assessed. This interchange consists of 6 ramp junctions as detailed below and shown in Exhibit 5.11.

- Junction 1 – Merge Junction where traffic from Highway 103 Eastbound merges onto Highway 102 Inbound.
- Junction 2 - Merge Junction where traffic from Highway 103 Eastbound merges onto Highway 102 Outbound.
- Junction 3 - Diverge Junction where traffic from Highway 102 Outbound traffic exits to access Highway 103 Westbound.
- Junction 4 - Diverge Junction where traffic from Highway 102 Inbound traffic exits to access Highway 103 Westbound.
- Junction 5 – Merge Junction where traffic from Highway 102 Inbound traffic merges to access Highway 103 Westbound.
- Junction 6 – Diverge Junction where traffic from Highway 103 Eastbound exits to access Highway 102 Inbound.

Ramp Junctions 1 and 2

Ramp junctions 1 and 2 are considered major merge areas as these locations have equal numbers of lanes entering and exiting the merge area. The recommended analysis methodology for these areas contained in the *Highway Capacity Manual* is to assess the capacity based on forecast volumes and number of lanes provided. This methodology was employed, allowing a volume-to-capacity indicator to be calculated for these ramps as summarized in Exhibit 5.12.



2
3
4
Hwy. 102 (Bicentennial Highway)
1
Bayers Lake Business Park
5
6
Hwy. 103

LEGEND:

(x) ANALYSIS LOCATIONS

Exhibit 5.11

HIGHWAY 102/ HIGHWAY 103 INTERCHANGE
ANALYSIS LOCATIONS

SGE Acres

Exhibit 5.12 V/C Ratios Ramp Junctions 1 and 2

Ramp Junction		AM Peak			PM Peak		
		Volume	**Capacity**	**V/C Ratio**	**Volume**	**Capacity**	**V/C Ratio**
1	Existing	2,893	6,600	0.44	2,502	6,600	0.38
	Future	5,210	6,600	0.79[1]	4,370	6,600	0.66
2	Existing	2,222	6,600	0.34	2,222	6,600	0.34
	Future	2,875	6,600	0.44	2,850	6,600	0.43

1. Although overall junction capacity is sufficient, ramp capacity is exceeded.

The overall capacity will not be exceeded at either Junction 1 or 2. However, the increased volumes under the future development scenario will result in the on-ramp from Highway 103 to Highway 102 at junction 1 being over capacity and requiring an additional lane at this location. The ramp volumes will be 3,095 vehicles in the AM Peak Hour and 2,210 vehicles in the PM Peak Hour. Thus the forecast AM Peak volumes will require another lane to be added to the ramp.

Ramp Junctions 3 and 4

At Ramp Junctions 3 and 4, the Level of Service was calculated in accordance with the methodology outlined in the Highway Capacity Manual. The post development traffic volumes will result in the Levels of Service at these ramp junctions decreasing to LOS C from LOS C, as summarized in Exhibit 5.13.

Exhibit 5.13 V/C Ratios Ramp Junctions 3 and 4

Ramp Junction	Existing Level of Service		Future Level of Service	
	AM Peak	**PM Peak**	**AM Peak**	**PM Peak**
3	B	B	B	C
4	B	B	C	C

As the Levels of Service, do not fall below D, no improvement would be required at these locations.

Ramp Junction 5

As the number of entering and exiting lanes is equal at Ramp Junction 5, it is considered a major merge and the capacity was analyzed in the same manner as Ramp Junctions 1 and 2. The volume-to-capacity ratios are shown in Exhibit 5.14 for existing and forecast future traffic volumes.

Exhibit 5.14 V/C Ratios Ramp Junction 5

Ramp Junction		AM Peak			PM Peak		
		Volume	**Capacity**	**V/C Ratio**	**Volume**	**Capacity**	**V/C Ratio**
5	Existing	630	4,400	0.15	995	4,400	0.23
	Future	1,450	4,400	0.33	2,610	4,400	0.59

As a volume of 2,200 vehicles/hour/lane will not be exceeded, sufficient capacity will exist on all components of the junction.

Ramp Junction 6

Ramp junction 6 is considered a major diverge as the number of entering and exiting lanes are equal. The volume-to-capacity ratios for this location are provided in Exhibit 5.15 for the existing and future conditions.

Exhibit 5.15 V/C Ratios Ramp Junction 6

Ramp Junction		AM Peak			PM Peak		
		Volume	**Capacity**	**V/C Ratio**	**Volume**	**Capacity**	**V/C Ratio**
6	Existing	1,839	4,400	0.42	1,854	4,400	0.42
	Future	4,240	4,400	0.96	3,030	4,400	0.69

Based on this assessment, an additional lane will be required to serve future AM Peak traffic volumes accessing Highway 102 inbound from Highway 103. This agrees with the assessment of Ramp Junction 1 provided above. During the future AM Peak analysis period, 3,095 vehicles are forecast to utilize the ramp, exceeding the capacity of the existing single lane ramp.

As a result of the analysis presented above, the future development in the Study Area will require the an additional lane to be added to the existing access ramp to serve traffic exiting Highway 103 and accessing Highway 102 inbound to the core area of HRM.

5.4 Roadway Connections External to the Study Area

In addition to the future linkage requirements outlined above, there are a number of problems outside the study area that have an important bearing on the considerations. The key external concern identified in the course of this study was the problem of accessing the Halifax Peninsula. This access is required to address the strong desire line between the study area and the peninsula, and to a lesser extent across the peninsula to points on the east side of Halifax Harbour such as Burnside Industrial Park.

In 2000, the Halifax Regional Municipality commissioned a study of Peninsula Access options that was intended to recommend policies regarding access problems. As the study has not been released, the study team has had to draw its own conclusions.

The consultations (Section III) indicated a high degree of driver frustration with the limited capacity of the Armdale Rotary and Quinpool Road. As a result, the present study will attempt to address the external constraints by focusing the internal network and access points towards the arterial network (100 series highways) and by attempting to lessen the importance of Trunk 3. Under the scenarios presented below, a majority of new traffic would be channelled to Highway 102 / Bayers Road area as opposed to the Armdale Rotary / Quinpool Road route.

5.5 Summary of Preferred Improvement Elements

The development of the preferred improvement package relied both on solutions developed from SGE Acres' analysis and solutions that were either recommended in past studies or planned for implementation. Based on future volumes an additional three entering and exiting lanes will have to be provided to meet future travel demand to and from the Study Area. In addition to the provision of additional access capacity, the improvement plan had to meet the following strategic goals:

- ***Support intrazonal trips:*** The proposed improvement program must be one in which the roadway infrastructure is sufficient to meet peak travel demand, namely the home-to-work trips between the Study Area and major areas of employment such as the Halifax Peninsula.
- ***Support future development:*** Adequate capacity must be provided to meet travel demand from areas of future residential and commercial development. In addition, network improvements must be phased in such a manner so that this capacity exists when required.
- ***Increase and manage access capacity to the study area:*** Our assessment has concluded that the existing number of lanes is not enough to support full build out of the proposed developments. As such, additional capacity must be provided.
- ***Reduce traffic demand on Trunk 3:*** In conjunction with providing increased roadway capacity to support new development, the components of the improvement plan must reduce the traffic demands on Trunk 3. This can be achieved through the provision of additional capacity on the Timberlea Village Parkway and connectivity between the proposed Governors Run Development and the Bayers Lake Business Park. In addition, the certain elements of connectivity between Highway 103 and Trunk 3 should be downplayed to decrease the attractiveness of Trunk 3 and emphasise the use of Highway 103.
- ***Improved Connectivity for area Business Parks:*** The improvement plan must also provide a linkage between the Bayers Lake and Ragged Lake Business Parks and improve their connectivity to Highway 103.

A brief summary of the components of the improvement plan are provided below:

- **Widening of Timberlea Village Parkway** – Roadway widening from the current two-lane cross-section to the proposed four-lane cross section will provide one additional lane of entrance and exit capacity. Previous analysis completed for a proposed development identified that the Timberlea Village Parkway would require widening to a four-lane cross-section by 2010. Additional transportation network improvements to support the role of the widened roadway include: improvements at the Highway 103/ Timberlea Village Parkway Interchange to provide increased capacity and to reduce conflicts between northbound through traffic on the Timberlea Village Parkway and traffic accessing the public street serving the Sobey's Development.

- **Lacewood Drive Widening** – Widening of Lacewood Drive will result in the separation of a shared thru and left turn movement into exclusive lanes in each direction. This will result in an additional capacity through the interchange area.
- **Washmill Court Extension** – The construction of this new road will have either one or two lanes provided in each direction depending on the selected cross-section width. Also included are related improvements to the Chain Lake Drive at Washmill Lake Court and the Chain Lake Drive at Susie Lake Crescent intersections.
- **Improvements to the Highway 103 Exit 2 Interchange** – This would see the construction of Option 3 to improve capacity and connectivity. This improvement strengthens transportation linkages between the Study Area and core areas of HRM and adjacent sections of the arterial highway system and provides a linkage between Bayers Lake and Ragged Lake Business Parks.
- **Trunk 3 at Route 333 Intersection Improvements** - Improvements at this location would improve access to Route 333 and areas of future development including the Western Common. These improvements would also improve existing intersection operations.
- **East Collector** - This was identified in the *Beechville Lakeside Timberlea Traffic Management Strategy* (1996) to provide a linkage between the Lakeside Industrial Park and the Timberlea Village Parkway/Highway 103 interchange. Construction of this roadway would also serve development in the area south of Trunk 3 and east of the Timberlea Village.
- **Governor's Run - Bayers Lake Business Park Linkage** - This improvement, also recommended in the 1996 *Traffic Management Strategy* includes extending Susie Lake Crescent to the west to access the Governo's Run Development and providing a connection between Governor's Run and Dominion Crescent.
- **Highway 102/Highway 103 Interchange Improvements** – This improvement would see an additional lane constructed to provide addtional capacity for traffic accessing Highway 102 inbound from Highway 103 easbound.

VI The Network Improvement Plan

6.1 Summary of Network Plan

The analysis in Section 5.0 allowed for the development of a Network Improvement Plan. The overall goal was to provide increased access capacity to the Study Area. The proposed improvement plan and forecast AADT volumes at full buildout of the Study Area are shown in Exhibit 6.1. Through the use of the Synchro model, the impacts of the recommended improvements on travel time were examined. Under the scenario, as discussed in Section 5.1.1, total travel time was forecast at 7,444 hours and 14,635 hours in the AM Peak and PM Peak hours respectively. With the proposed improvement packages and at full build out, total travel times on the network would be 304 hours in the AM Peak and 529 hours in the PM Peak. This represents travel time savings of 21,250 hours each weekday.

Once the initial concept of the preferred improvement package was developed, a more detailed analysis of the package was performed. This analysis had the following principal goals:

- Review the traffic operations of the proposed solution package to identify any problem areas. Where problem areas were identified, provide an adequate roadway configuration (i.e. type and number of lanes) and an appropriate level of traffic control to meet the relevant guidelines and standards of TPW, HRM and the Transportation Association of Canada and provided efficient, safe operation.
- To develop a cost estimate and implementation timeline for the proposed improvement package.

In addition, non-structural measures were reviewed. These initiatives do not include roadway improvements but instead focus on means of reducing travel demand through such means as transit, flexible work hours and telecommuting.

The goals and objectives met by each of the major components of the proposed Improvement Plan are provided in Exhibit 6.2.

6.2 Operational Analysis of Planned Roadway Improvements

The Synchro software was used to analyze the traffic operations in the Study Area with the existing and future development levels. This analysis also included improvements to the roadway network through improvements to existing infrastructure and the development of new roadway infrastructure. This package incorporates elements that have been recommended in past studies in the area including:

- Widening of the Timberlea Village Parkway to 4 lanes.
- Construction of the East Connector
- Construction of Governor Village Collector Roads
- Extension of Washmill Lake Court under Highway 102.

Insert Exhibit 6.1 - Future Volume Map

Project:

Governor's Lake Area Transportation Study

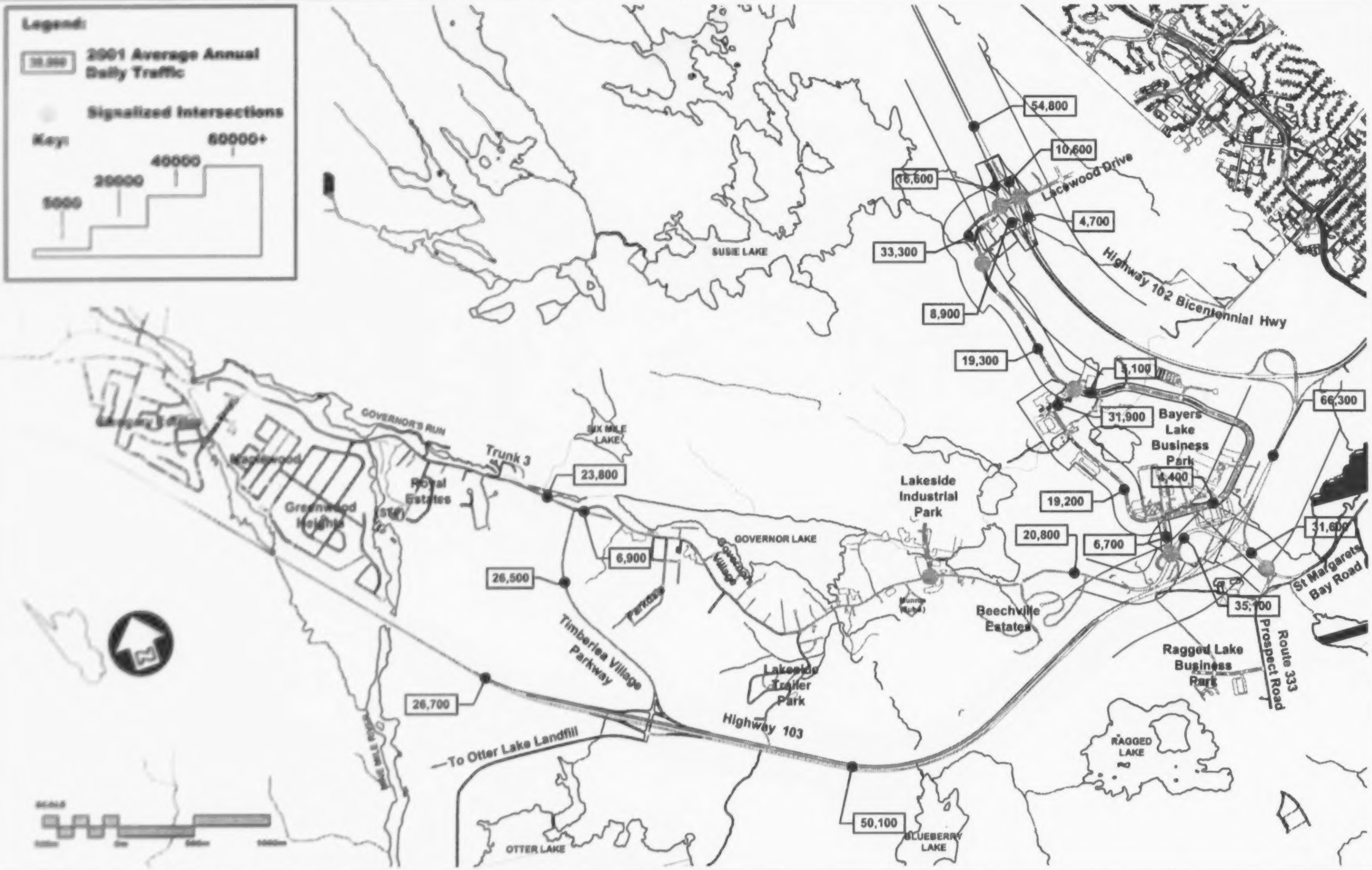
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 6.1

Future Traffic Flow & Volumes

SGE Acres



Legend:
2001 Average Annual Daily Traffic
Signalized Intersections
Key:
5000
20000
40000
60000+
54,800
10,600
16,600
Lacewood Drive
4,700
33,300
Highway 102 Bicentennial Hwy
8,900
19,300
5,100
31,900
Bayers Lake Business Park
66,300
4,400
19,200
20,800
6,700
31,600
35,700
St Margarets Bay Road
Route 333 Prospect Road
Ragged Lake Business Park
RAGGED LAKE
Lakeside Industrial Park
Beechville Estates
SUSIE LAKE
GOVERNOR'S RUN
SIX MILE LAKE
Trunk 3
23,800
Royal Estates
Greenwood Heights
GOVERNOR LAKE
Governor's Village
6,900
26,500
Timberlea Village Parkway
Lakeside Trailer Park
Highway 103
26,700
—To Otter Lake Landfill
OTTER LAKE
50,100
BLUEBERRY LAKE
SCALE

Exhibit 6.2 Improvement Plan: Goals and Objectives Met

Improvement	**Goal/Objectives**
Highway 103 Exit 2 Interchange Improvements	Link Bayers Lake – Ragged Lake Business Parks Provide Increased Access Capacity Support Intrazonal Trips Downplay demand on Trunk 3
Washmill Court Extension	Distribute Traffic from Lacewood Drive Provide Increased Access Capacity Support Future Development Downplay demand on Trunk 3 Support Travel Desire Lines
Lacewood Drive Improvements	Provide Increased Access Capacity Downplay demand on Trunk 3
Widening of the Timberlea Village Parkway	Provide Increased Access Capacity Support Future Development Downplay demand on Trunk 3 Support Travel Desire Lines
Trunk 3 at Route 333 Intersection Improvements	Support Future Development Support Intrazonal Trips Downplay demand on Trunk 3 Support Travel Desire Lines
East Collector	Support Future Development Support Intrazonal Trips Downplay demand on Trunk 3 Support Travel Desire Lines
Governor's Run / Bayers Lake Business Park Linkage	Link Bayers Lake – Lakeside Business Parks Access Governors Run Business Park Expansion Support Future Development Support Intrazonal Trips Downplay demand on Trunk 3 Support Travel Desire Lines

Details and the results of the operational analysis for the various components of the improvements are discussed below. The overall intersection volume-to-capacity ratio, delay and overall LOS for signalized intersections are summarized in Exhibit 6.3.

An index drawing illustrating the location of all major functional details is presented 6.4.

Exhibit 6.3 – Intersection Operations

	Location	Peak Period	Existing Conditions			Future Conditions[iv]			Future Conditions with Improvements[v]		
			V/c[i]	Delay[ii]	LOS[iii]	V/c	Delay	LOS	V/c	Delay	LOS
1	Lacewood Drive at Hwy 102 NB Off-Ramp	AM	0.20	8.5	A	0.38	10.7	B	0.40	9.6	A
		PM	0.65	17.6	B	0.69	12.8	B	0.51	3.3	A
2	Lacewood Drive at Hwy 103 SB Off-Ramp	AM	0.33	15.2	B	0.83	105.7	F	0.33	10.3	B
		PM	0.71	21.7	C	1.37	440.7	F	0.76	16.8	B
3	Chain Lake Drive at Washmill Lake Cres.	AM	0.30	9.2	A	1.68	>120	F	0.62	27.0	C
		PM	0.47	10.9	B	1.84	>120	F	0.89	35.3	D
4	Chain Lake Drive at Susie Lake Cres.	AM	0.03	9.4	B	NC	NC	F	0.65	9.2	A
		PM	0.14	11.3	D	NC	NC	F	0.91	26.2	C
5	Chain Lake Drive at Ragged Lake Connector	AM	Not applicable			Not applicable			0.59	8.5	A
		PM	Not applicable			Not applicable			0.87	22.4	C
6	Chain Lake Drive at Lakelands Boulevard	AM	0.56	15.0	B	0.82	25.6	D	No additional improvements		
		PM	1.36	193.7	F	0.77	27.6	D			
7	Lakelands Boulevard at Trunk 3	AM	0.37	29.5	C	0.61	18.1	B	No additional improvements		
		PM	0.68	43.7	D	0.47	15.1	B			
8	Trunk 3 at Hwy 103 EB On-Ramp	AM	0.75	>120	F	0.76	22.6	C	No additional improvements		
		PM	7.30	>120	F	0.86	39.8	E			
9	Trunk 3 at Hwy 333 (Prospect Rd)	AM	0.72	19.3	B	1.24	70.5	E	0.79	10.2	B
		PM	1.25	75.2	E	2.90	>120	F	0.82	18.2	B
10	Ragged Lake Connector at Hwy 103 WB On-Ramp	AM	Not applicable			Not applicable			0.26	1.6	A
		PM	Not applicable			Not applicable			0.67	6.6	A
11	Ragged Lake Connector at Hwy 103 WB Off-Ramp - Left-turn lane	AM	Not applicable			Not applicable			0.58	17.7	C
		PM	Not applicable			Not applicable			0.60	24.9	C
12	Ragged Lake Connector at Hwy 103 WB Off-Ramp - Right-turn lane	AM	Not applicable			Not applicable			0.87	28.0	D
		PM	Not applicable			Not applicable			0.88	34.1	D
13	Trunk 3 at Timberlea Village Pkwy	AM	0.20	17.0	C	0.49	13.3	B	No additional improvements		
		PM	0.81	48.3	E	0.76	22.9	C			
14	Timberlea Village Pkwy at Hwy 103 WB	AM	0.01	12.2	B	0.16	>120	F	0.60	19.5	B
		PM	0.01	9.8	A	0.06	44.0	E	0.54	18.1	B
15	Timberlea Village Pkwy at Hwy 103 EB	AM	0.12	23.1	C	NC	>120	F	0.73	11.3	B
		PM	0.04	10.6	B	17.9	>120	F	0.61	14.9	B

[i] V/c, Volume to capacity ratio.

[ii] Delay, Average vehicle delay measured in seconds.

[iii] LOS, Level-of-service

[iv] "Future Conditions" refers to conditions after full build-out of developments, Trunk 3/ Hwy 103 Interchange Improvements and construction of Washmill Lake Extension.

[v] "Future Conditions with improvements" refers to conditions after improvements at the intersection in question.

6.4

Project:

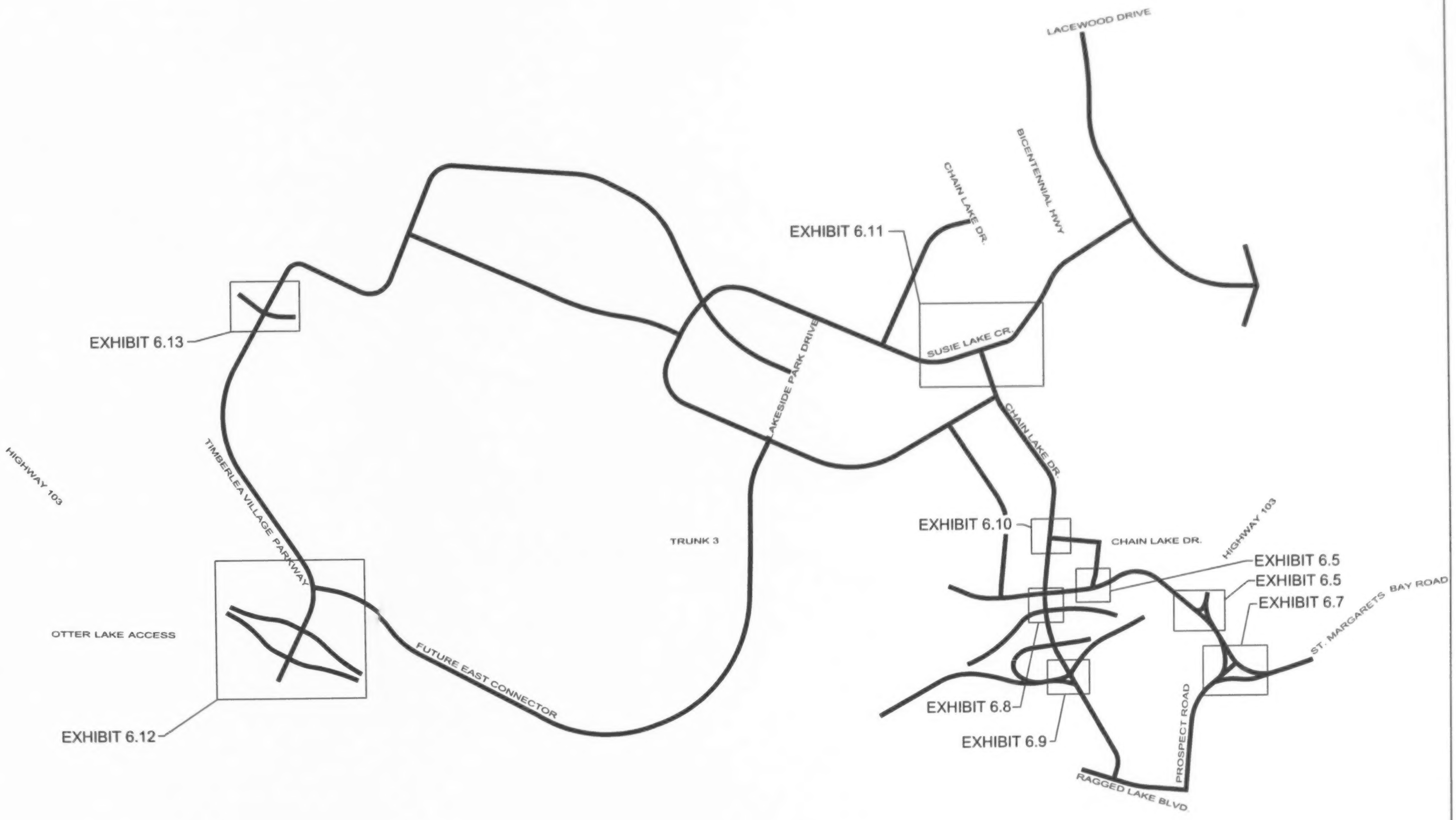
Governor's Lake Area Transportation Study

BEECHVILLE - LAKESIDE - TIMBERLEA

Title: *Exhibit 6.4*

Key Plan (Index to subsequent drawings)

SGE Acres


LACEWOOD DRIVE
BICENTENNIAL HWY
CHAIN LAKE DR.
EXHIBIT 6.11
EXHIBIT 6.13
SUSIE LAKE CR.
LAKESIDE PARK DRIVE
CHAIN LAKE DR.
HIGHWAY 103
TIMBERLEA VILLAGE PARKWAY
TRUNK 3
EXHIBIT 6.10
CHAIN LAKE DR.
HIGHWAY 103
EXHIBIT 6.5
EXHIBIT 6.5
EXHIBIT 6.7
ST. MARGARETS BAY ROAD
OTTER LAKE ACCESS
FUTURE EAST CONNECTOR
EXHIBIT 6.8
EXHIBIT 6.9
PROSPECT ROAD
EXHIBIT 6.12
RAGGED LAKE BLVD.

6.2.1 Highway 103 / Exit 2 Interchange Improvements

Based on the analysis, an improvement option was developed for an improved Highway 103/Trunk 3 interchange that retains the continuity between Trunk 3 and St. Margaret's Bay Road while meeting other strategic goals such as linking the Bayers Lake and Ragged Lake Business Parks. A drawing of the overall proposed interchange reconfiguration is provided in Appendix G.

The design consists of a combination loop road and diamond interchange. Portions of the existing interchange would be retained including the existing ramps onto Highway 103 eastbound on the east side of Trunk 3 and the off ramp that permits westbound traffic to exit Highway 103 and access St. Margaret's Bay Road eastbound. The existing off ramp from Highway 103 eastbound onto Trunk 3 would be abandoned as shown in Exhibit 6.6 along with the existing on ramp from Lakelands Boulevard to Highway 103 westbound. Access between Bayers Lake and the Ragged Lake Business Parks would be provided via new bridge structures over Highway 103 and a realigned Trunk 3.

Evaluating the operational performance of the improvements involved examining the operation of five major intersections:

- Chain Lake Drive at Lakelands Boulevard
- Lakelands Boulevard at Trunk 3
- Chain Lake Drive at Ragged Lake Connector
- Trunk 3 at the Highway 103 eastbound on ramp
- Trunk 3 at Route 333
- Ragged Lake Connector at Highway 103 access ramps.

Chain Lake Drive at Lakelands Boulevard will continue to operate as a four-way stop controlled intersection and the lane configuration will remain the same. The intersection will operate at a LOS D in both the AM and PM Peak analysis periods.

Operations at the Lakelands Boulevard/Trunk 3 intersection will actually improve due to the reassignment of traffic as a result of the roadway improvements. The future LOS will be B for both the AM Peak and PM Peak analysis periods with delays per vehicle in the 15 to 18 second range. The reconfiguration of the intersection will have the Lakelands Boulevard southbound approach reconstructed to include one left-turn lane and one right-turn lane. The Trunk 3 eastbound approach will consist of one left-turn lane and two through lanes and the westbound approach will have one right-turn lane and two through lanes. The intersection configuration is shown in Exhibit 6.5.

With the resulting traffic patterns from the interchange reconstruction, the intersection of Trunk 3 and the Highway 103 eastbound on-ramp will operate at LOS C in the future AM Peak analysis period and LOS E in the PM Peak analysis period for the critical left turn movement. Vehicle delays will average 23 seconds/vehicle and 40 seconds/vehicle in the AM and PM Peak periods respectively, with intersection wide volume-to-capacity ratios of 0.76 and 0.86 respectively. Exhibit 6.6 provides the conceptual design of the intersection.

Project:

Governor's Lake Area Transportation Study

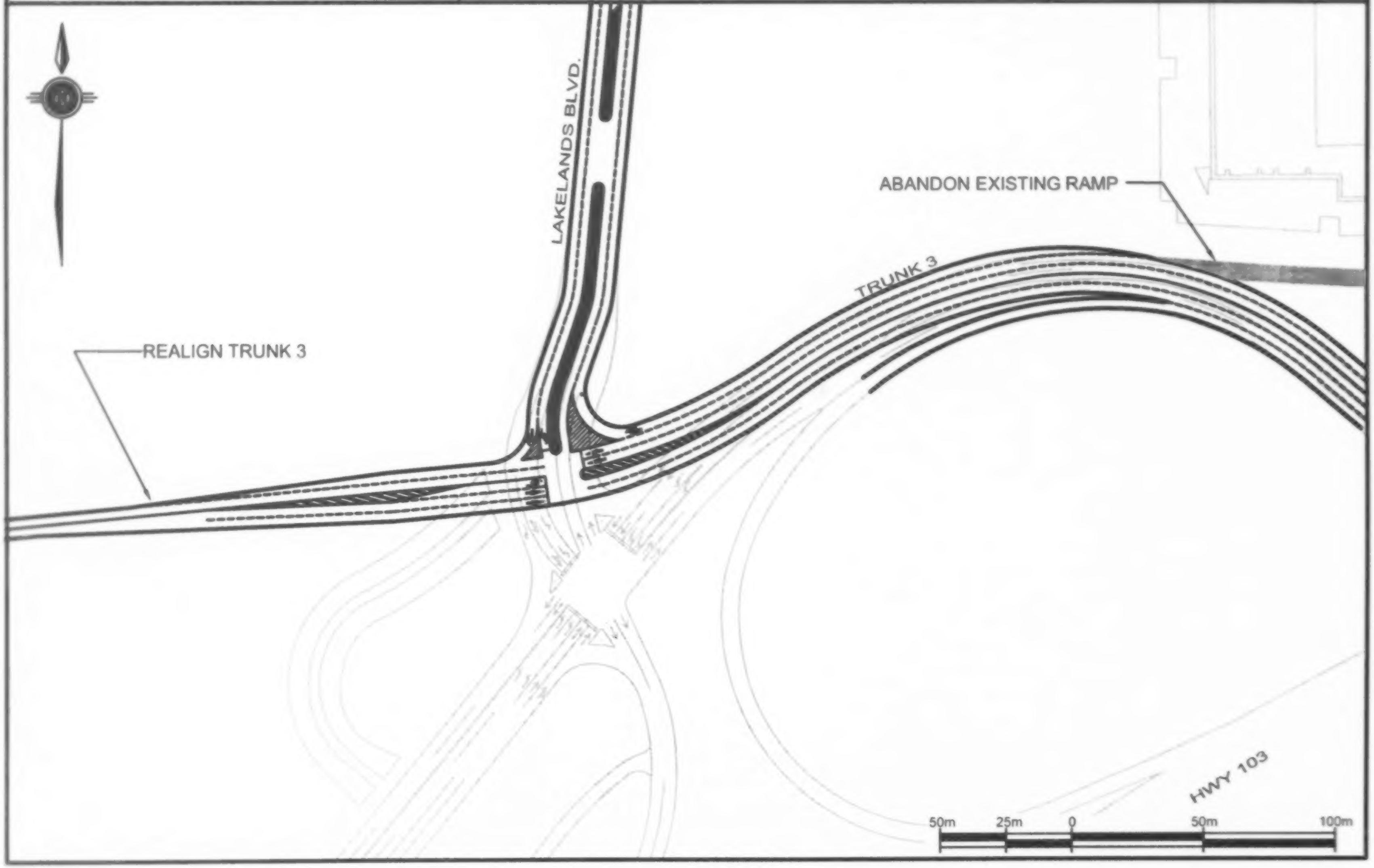
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 6.5

Lakelands Boulevard at Trunk 3

SGE Acres


LAKELANDS BLVD.
ABANDON EXISTING RAMP
TRUNK 3
REALIGN TRUNK 3
HWY 103
50m
25m
0
50m
100m

Project:

Governor's Lake Area Transportation Study

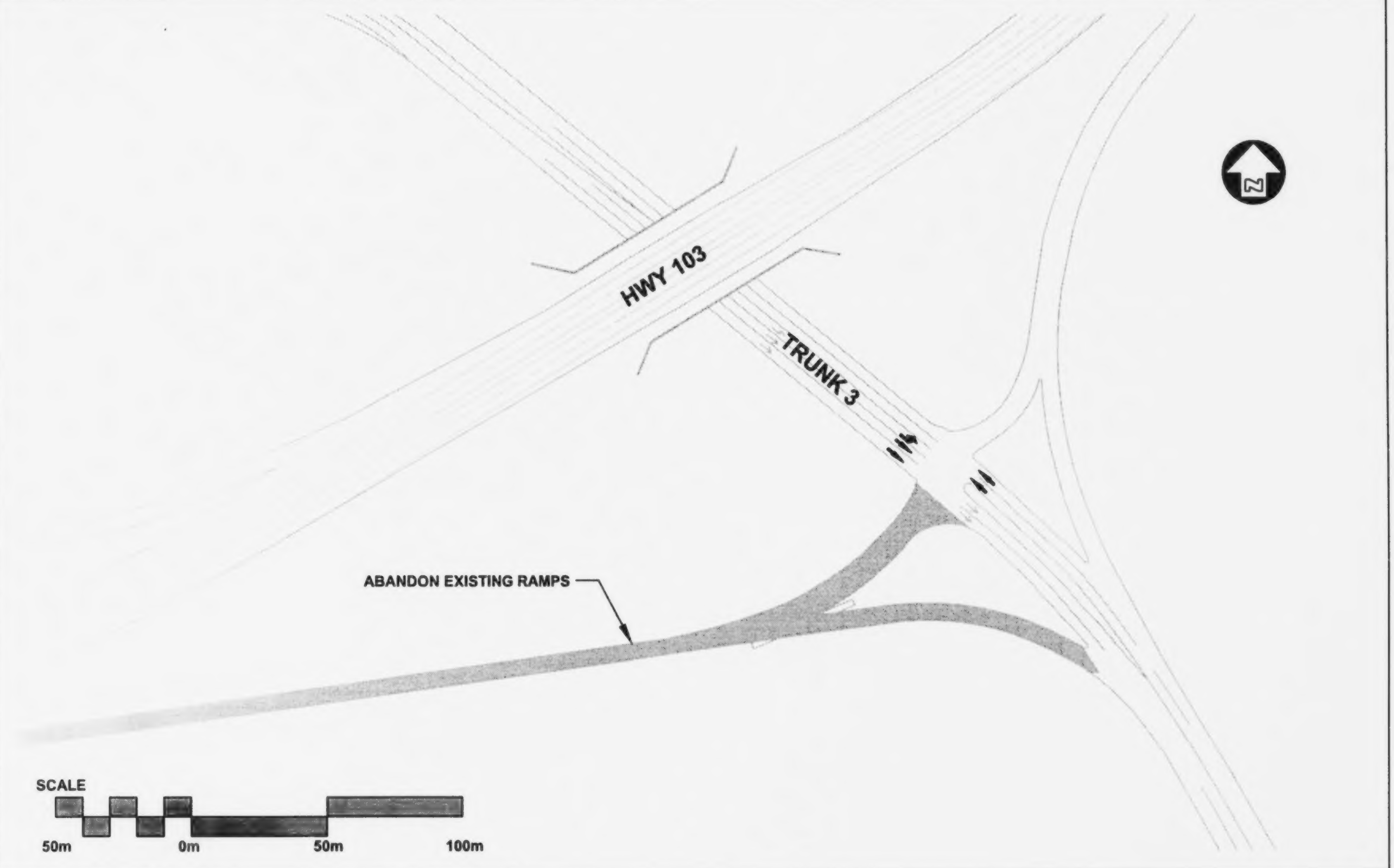
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 6.6

Trunk 3 at Highway 103 Eastbound Ramps

SGE Acres


HWY 103
TRUNK 3
N
ABANDON EXISTING RAMPS
SCALE
50m
0m
50m
100m

At the Route 333/Trunk 3 intersection, the intersection will operate at a LOS B in both the future AM Peak and PM Peak analysis periods. Average delays per vehicle will be in the 18 to 19 second range with a maximum volume to-capacity ratio of 0.82 in the PM Peak. The Trunk 3 westbound approach will need to be widened to accommodate an additional left-turn lane as shown in Exhibit 6.7.

The intersection of the Ragged Lake Connector and the Highway 103 westbound on-ramp will operate at a LOS A during the AM Peak and PM peak analysis periods. Delays are projected to be below 7 seconds/vehicle and the volume-to-capacity ratio will be at a maximum of 0.67 in the PM Peak. We recommend that this intersection be signalized due to the difficult left-turn that will be experienced by northbound traffic on the Ragged Lake Connector. It is recommended that the northbound approach be constructed with one left-turn lane and one through lane and that the southbound approach consist of two through lanes and one right-turn lane. Conceptual design of this location is shown in Exhibit 6.8 with the Highway 103 eastbound ramps shown in Exhibit 6.9.

On the westbound off-ramp from Highway 103 onto the Ragged Lake Connector, the right turn movement is projected to operate at a LOS D during both the AM Peak and PM Peak analysis periods. The overall delay for right turning vehicles will be in the 28 second to 35-second range and the overall v/c ration for the intersection will be 0.87 in the AM Peak and 0.88 in the PM Peak.

The intersection of Chain Lake Drive and Ragged Lake Connector will be a new signalized intersection constructed when the linkage between the Ragged Lake and Bayers Lake Business Parks is built. Based on forecast traffic volumes, this intersection will operate at a LOS A in the AM Peak and C in the PM Peak. Operations during the PM Peak will have slightly higher levels of delay and volume-to-capacity ratios than the AM Peak with a volume-to-capacity ratio of 0.87 and delay of 22.4 seconds/vehicle for the intersection. Improvements on the Chain Lake Drive southbound approach would include widening to provide a left-turn lane and two through lanes. This intersection is shown in Exhibit 6.10.

Project:

Governor's Lake Area Transportation Study

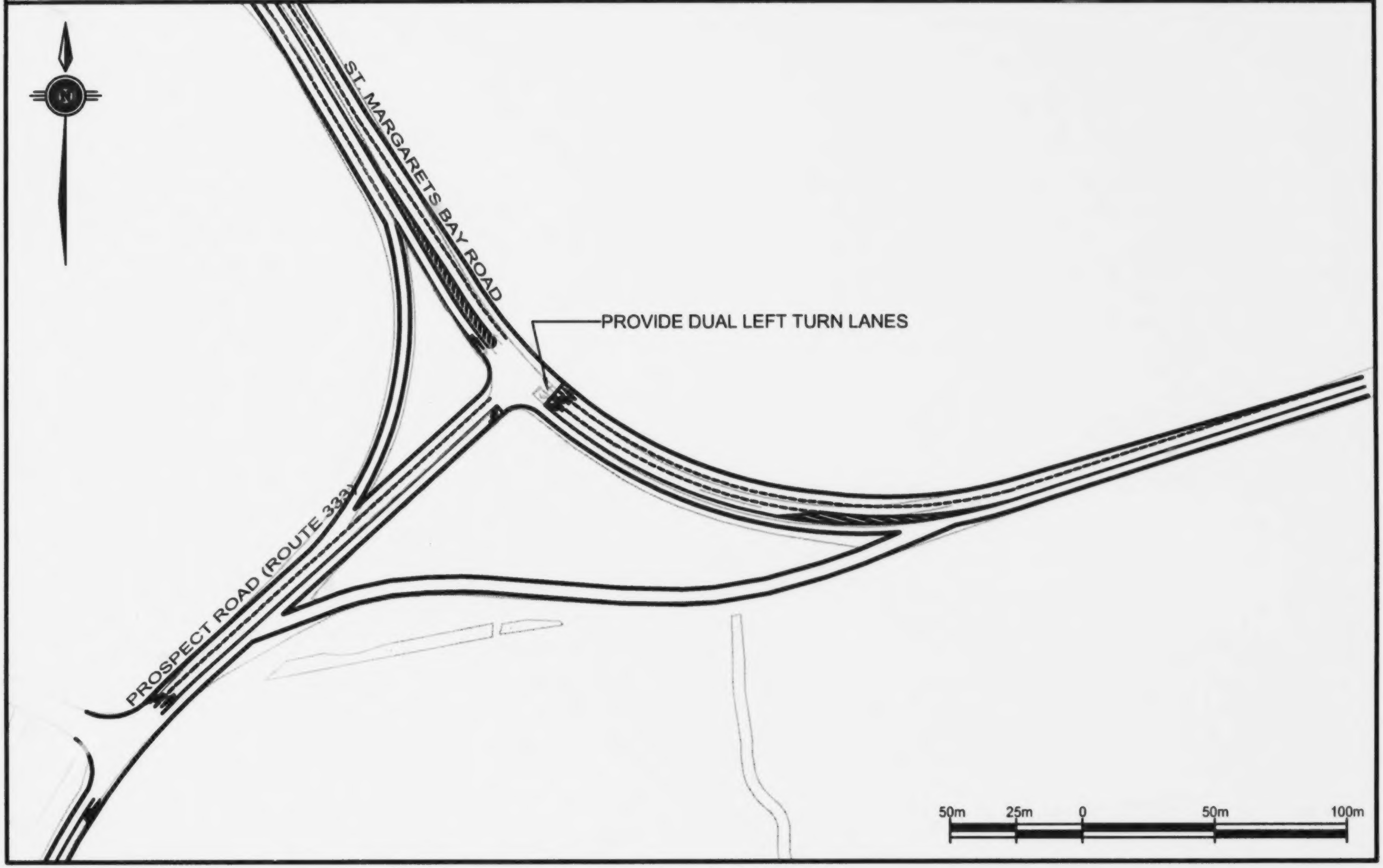
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 6.7

Trunk 3 at Route 333

SGE Acres


N
ST. MARGARETS BAY ROAD
PROVIDE DUAL LEFT TURN LANES
PROSPECT ROAD (ROUTE 333)
50m
25m
0
50m
100m

Project:

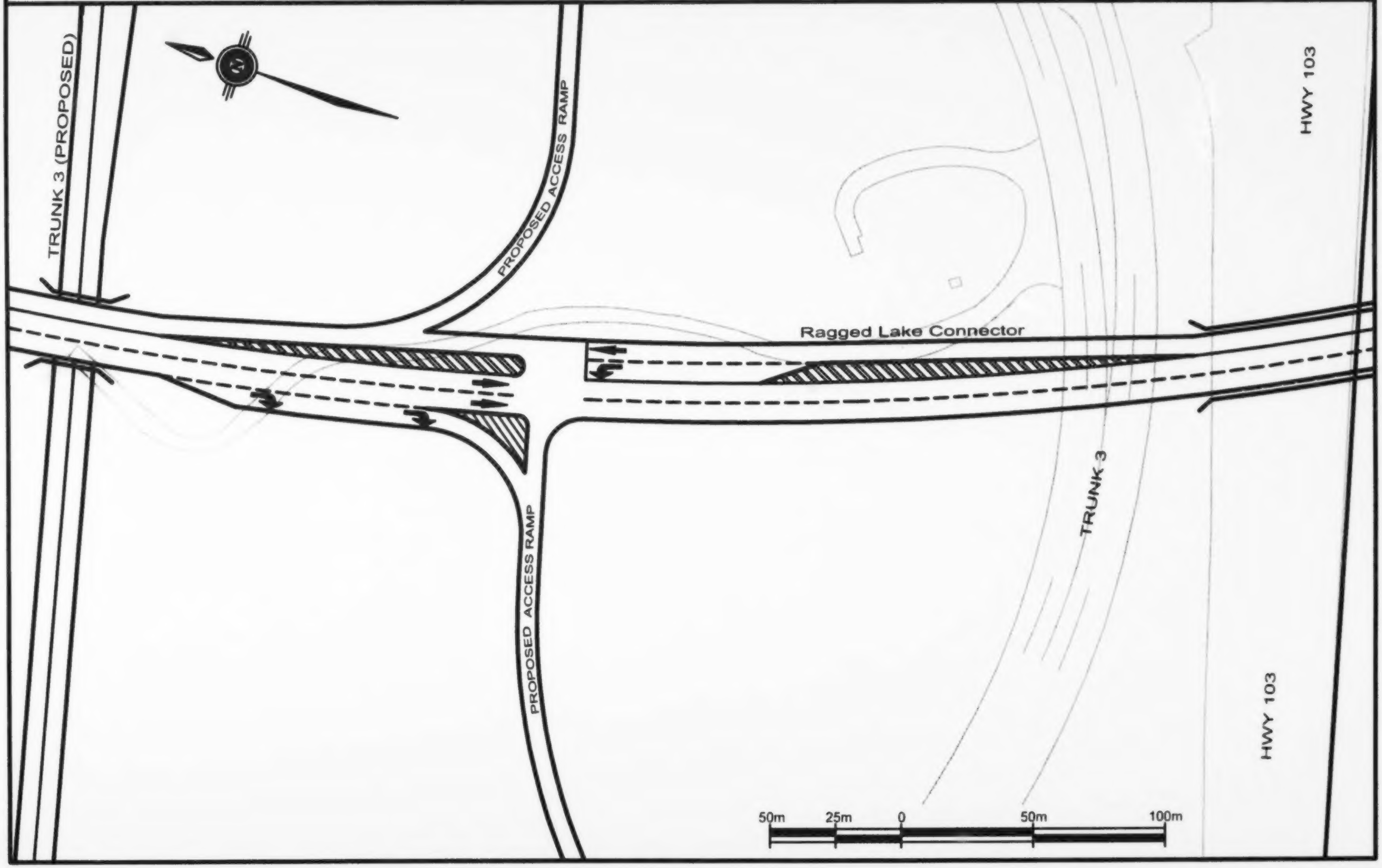
Governor's Lake Area Transportation Study

BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 6.8
Ragged Lake Connector at Highway 103 Westbound Ramps

SGE Acres


TRUNK 3 (PROPOSED)
PROPOSED ACCESS RAMP
Ragged Lake Connector
HWY 103
TRUNK 3
PROPOSED ACCESS RAMP
HWY 103
50m
25m
0
50m
100m

Project:

Governor's Lake Area Transportation Study

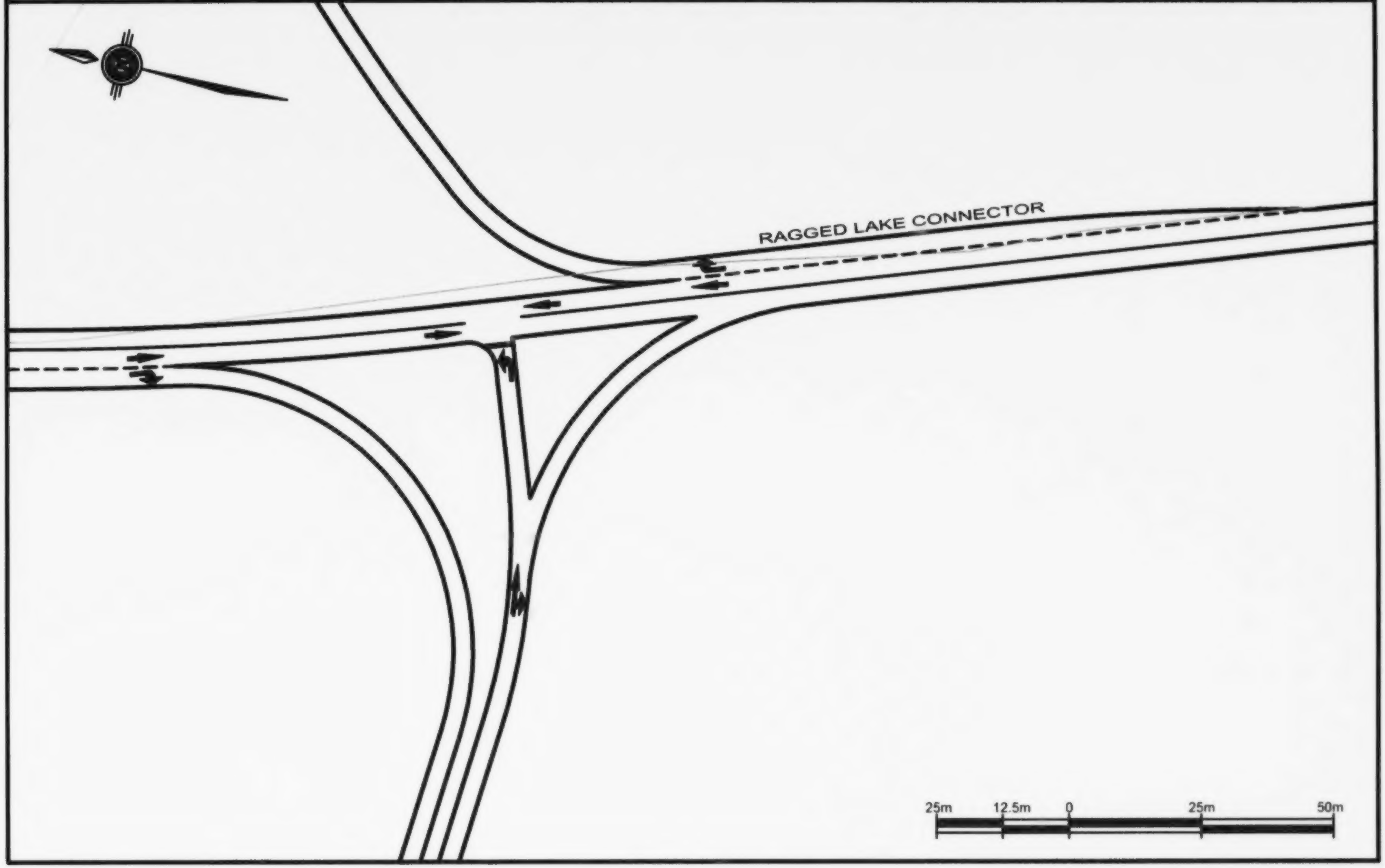
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 6.9

Ragged Lake Connector at Highway 103 Eastbound Ramps

SGE Acres


RAGGED LAKE CONNECTOR
25m
12.5m
0
25m
50m

Project:

Governor's Lake Area Transportation Study

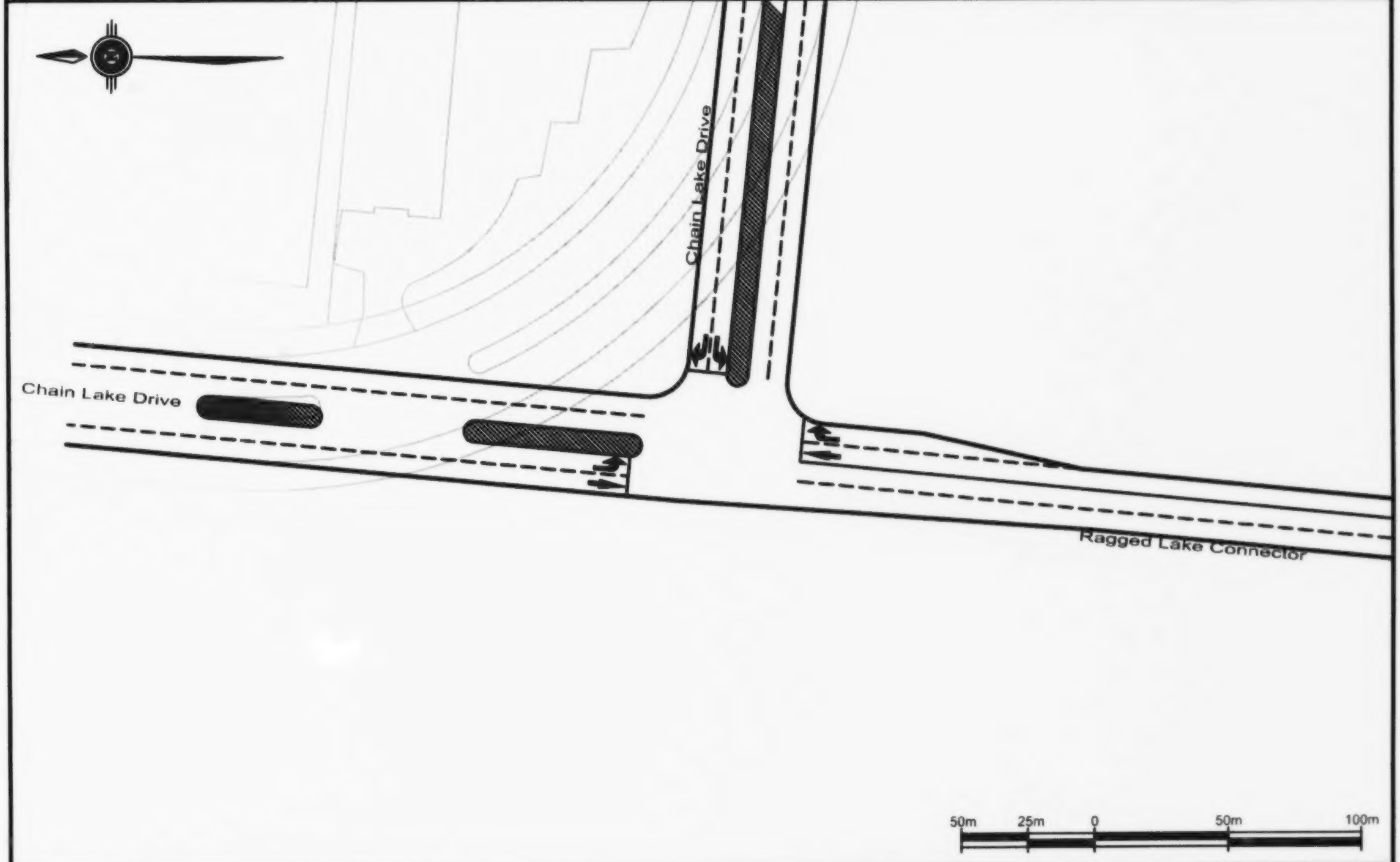
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 6.10

Chain Lake Drive at Ragged Lake Connector

SGE Acres


Chain Lake Drive
Chain Lake Drive
Ragged Lake Connector
50m
25m
0
50m
100m

6.2.2 Washmill Lake Court Ext. / Bayers Lake Roadway Improvements

This improvement will involve extending Washmill Lake Court from its current terminus eastward under Highway 102 to the Parkland Drive South Area as shown in Exhibit 6.11. The roadway will have a four-lane cross-section. Construction of the extension combined with the other roadway improvements will result in the Chain Lake Drive/Washmill Lake Crescent intersection operating with Levels of Service of C and D for the AM Peak and PM Peak analysis periods respectively. During the AM Peak period, the average delay per vehicle will be 27 seconds/vehicle and the volume-to-capacity ratio will be 0.62. The PM Peak will have 35 seconds/vehicle of delay and a volume-to-capacity ratio of 0.89.

The Washmill Lake westbound approach should be widened from two lanes to four. Due to the anticipated traffic volumes at this approach, one left-turn lane, two through lanes and one right-turn lane should be constructed. The northbound approach will not require any improvements at this time. The Chain Lake Drive eastbound approach should be widened to accommodate an additional through lane. The southbound approach should also be widened and restriped to provide one left-turn lane, one through lane and two right-turn lanes. With the anticipated volumes making a right-hand turn (approximately 900 vehicles) and the through volumes (approximately 1,400 vehicles) from the Washmill Lake Extension, a single channelized right-turn lane will not be sufficient to accommodate the southbound approach. Over the longer term, a potential roadway improvement option would be to realign Chain Lake Drive from north of the proposed Susie Lake/Washmill Lake Extension intersection to the existing three-leg intersection at Susie Lake Drive and Chain Lake Drive.

The intersection of Chain Lake Drive at Susie Lake Crescent will require the construction of a dual left turn lane on the westbound Susie Lake Crescent approach. With the installation of signals, this intersection will function at a LOS A in the AM Peak and LOS C in the PM Peak. The AM Peak delay will be 9.2 seconds/vehicle and the volume-to-capacity ratio will be 0.65. During the PM Peak, these numbers will increase to 26 seconds/vehicle and a v/c ratio of 0.91. This intersection will require the installation of traffic signals. The Chain Lake Drive westbound approach will require widening and should be striped for two through lanes and two left-turn lanes. The Susie Lake eastbound approach should be restriped for one through lane and one right-turn lane. The Chain Lake Drive northbound approach will not require any improvements at this time.

Project:

Governor's Lake Area Transportation Study

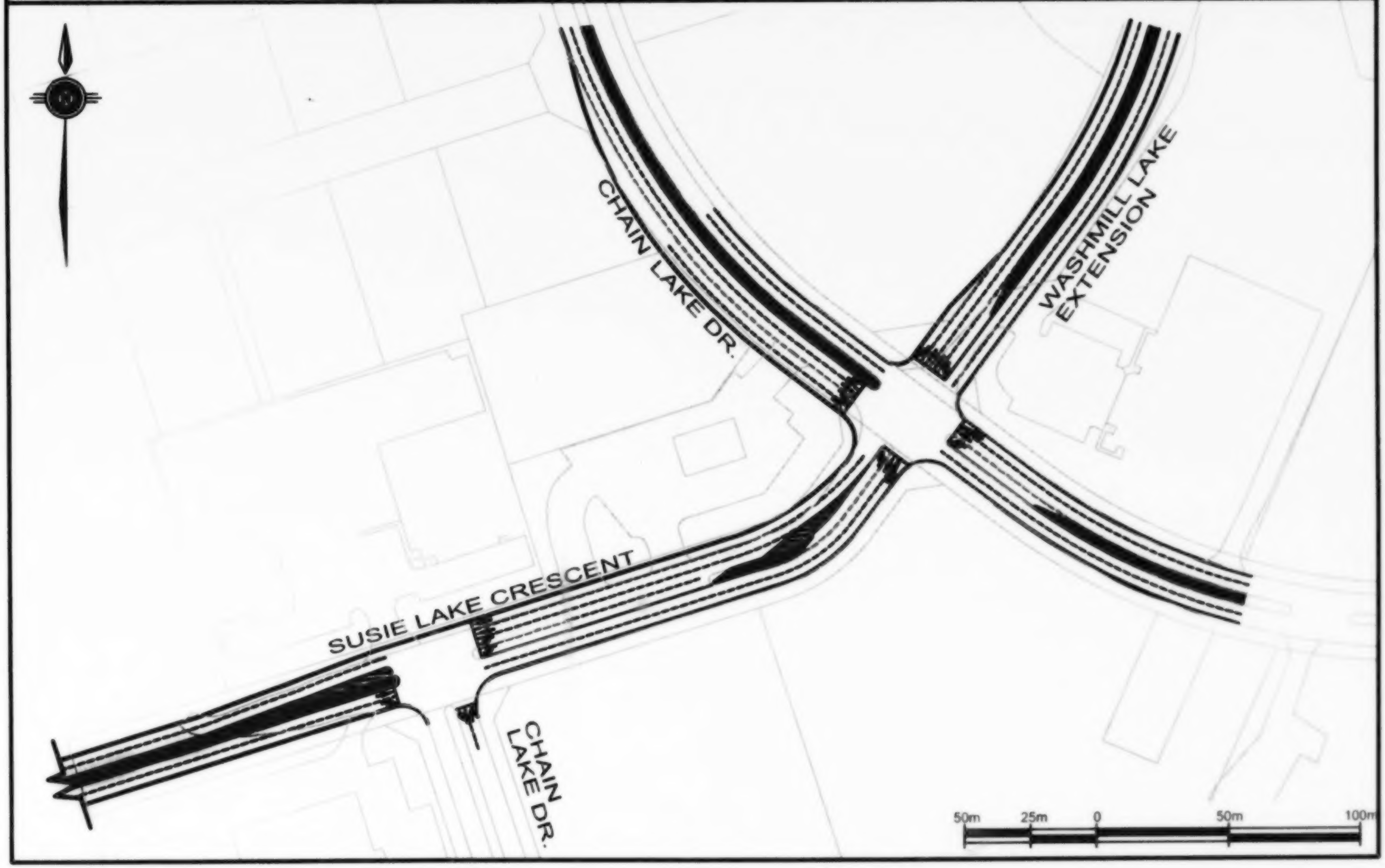
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 6.11

Chain Lake Drive at Susie Lake Crescent / Washmill Lake Court

SGE Acres


CHAIN LAKE DR.
WASHMILL LAKE EXTENSION
SUSIE LAKE CRESCENT
CHAIN LAKE DR.
50m
25m
0
50m
100m

6.2.3 Highway 102 (Bicentennial Highway) at Lacewood Drive Improvements

Under future conditions, some of the Bayers Lake traffic will be diverted from Lacewood Drive to Washmill Lake Court Extension. This will result in a lower westbound through volume on Lacewood Drive. Improvements are currently planned for implementation in 2003 at this location. Based on our analysis, these improvements, in conjunction with our recommended improvement package will be sufficient to accommodate future travel demand.

6.2.4 Highway 103/Timberlea Village Parkway Interchange Improvements

Improvements at this location will be required as a result of the high volume of traffic making a left turn from the Timberlea Village Parkway to access Highway 103 eastbound. Additional left turn capacity could be provided for this movement by one of the following three options:

- Provision of an exclusive left-turn lane and shared left turn and thru lane on the southbound approach. This would not require widening of the existing three-lane overpass structure.
- Provision of a dual-left turn lane and a thru lane on the southbound approach. This would require widening of the existing three-lane overpass structure.
- Provision of a directional ramp in the southwest quadrant of the interchange that would allow traffic to access Highway 103 eastbound without making a left turn.

It is recommended that the directional ramp in the southwest quadrant of the interchange be provided as shown in Exhibit 6.12. This will require relocation of the existing ramp that accommodates the exit movement from Highway 103 eastbound, as well as the partial realignment of the Otter Lake Landfill Access Road.

At this location, the key issue is the potential for exiting vehicle conflicts on the section of the Timberlea Village Parkway between the Highway 103 Westbound off-ramp and the public street serving the Sobey's development. This section of roadway is approximately 160 meters in length. Given the potential for weaving conflicts on this short section of the Timberlea Village Parkway between the off-ramp and the public street, we propose that two right-turn lanes be provided for traffic accessing the Timberlea Village Parkway from the Highway 103 westbound off-ramp. Also, the radius of the channelized right turn should be reduced.

Provision of two lanes for traffic making a right turn from the Highway 103 off-ramp onto the Timberlea Village Parkway will allow for the separation of traffic destined for the roadway into the Sobey's Development and traffic that is either destined for the north on the Timberlea Village Parkway or the East Collector. This improvement is shown conceptually in Exhibit 6.12. The intersection of the northern most right-turn lane and the Timberlea Village Parkway will be an unsignalized intersection where the right turn lane from the on-ramp will develop into its own lane on the Timberlea Village Parkway. The southern intersection of the Highway 103 westbound off-ramp and the Timberlea Village Parkway will be a signalized intersection as traffic volumes warrant. Traffic, which will

Project:

Governor's Lake Area Transportation Study

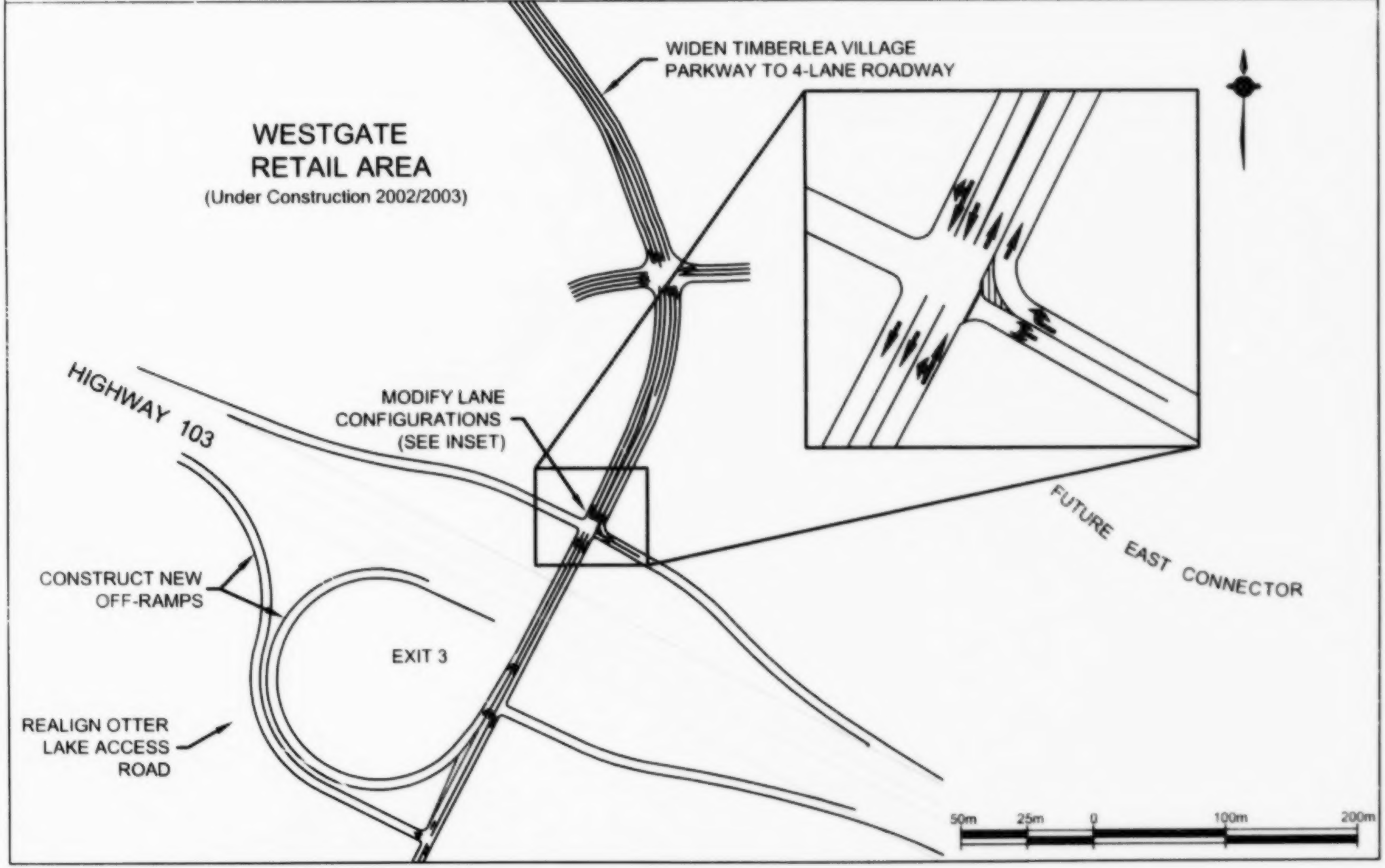
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 6.12

Timberlea Village Parkway / Highway 103 Interchange

SGE Acres


WIDEN TIMBERLEA VILLAGE PARKWAY TO 4-LANE ROADWAY
WESTGATE RETAIL AREA
(Under Construction 2002/2003)
HIGHWAY 103
MODIFY LANE CONFIGURATIONS (SEE INSET)
FUTURE EAST CONNECTOR
CONSTRUCT NEW OFF-RAMPS
EXIT 3
REALIGN OTTER LAKE ACCESS ROAD
50m
25m
0
100m
200m

ultimately make a left-turn onto the Public Street serving the Sobey's Development, will use the southern most right turn lane. The northern most right turn lane will be used by traffic that will not access the public street serving the Sobey's Development.

During the AM Peak analysis period, the signalized intersection at the southern most off-ramp will operate at a LOS B with a volume-to-capacity ratio of 0.60 and 19.5 seconds of delay per vehicle. During the PM Peak, the intersection will have a LOS E, volume-to-capacity ratio of 0.88 and an average delay of 60 seconds/vehicle.

The southbound approach should be widened to three lanes and the northbound approach narrowed to one shared left and thru lane. Under full build out, the two intersections at the interchange will operate at a LOS B in the AM Peak and PM Peak analysis periods. At the westbound access ramp intersection, delays will be in the 18 second to 20 second per vehicle range, with volume-to-capacity ratios of 0.54 and 0.60 in the AM Peak and PM Peak periods respectively. At the intersection of the eastbound access, delays will be in the 11 second to 15 second per vehicle range, with volume-to-capacity ratios of 0.73 and 0.61 in the AM Peak and PM Peak periods.

6.2.5 Timberlea Village Parkway at Trunk 3

When the Governor's Run access road is constructed at the intersection of Timberlea Village Parkway and Trunk 3, it is recommended that the existing lane configurations be changed and traffic signals be installed. The Timberlea Village Parkway northbound approach should be restriped to provide one left-turn lane and one shared through-right turn lane. The southbound approach should consist of 4 lanes: one left-turn lane, two-through lanes and one right turn lane. The Trunk 3 westbound approach should be restriped to one left-turn and one shared through-right turn lane. The Trunk 3 eastbound approach should be widened from a one-lane approach to three lanes that would consist of one left-turn lane, one through lane and one channelized right-turn lane. These improvements are shown in Exhibit 6.13. This intersection will operate at a LOS B in the AM Peak analysis period and a LOS C in the PM Peak analysis period. Overall delays per vehicle will be 13 seconds/vehicle in the AM Peak analysis period and 23 seconds/vehicle in the PM Peak analysis period. The volume-to-capacity ratios will be 0.49 and 0.76 for the AM Peak and PM Peak periods respectively.

Project:

Governor's Lake Area Transportation Study

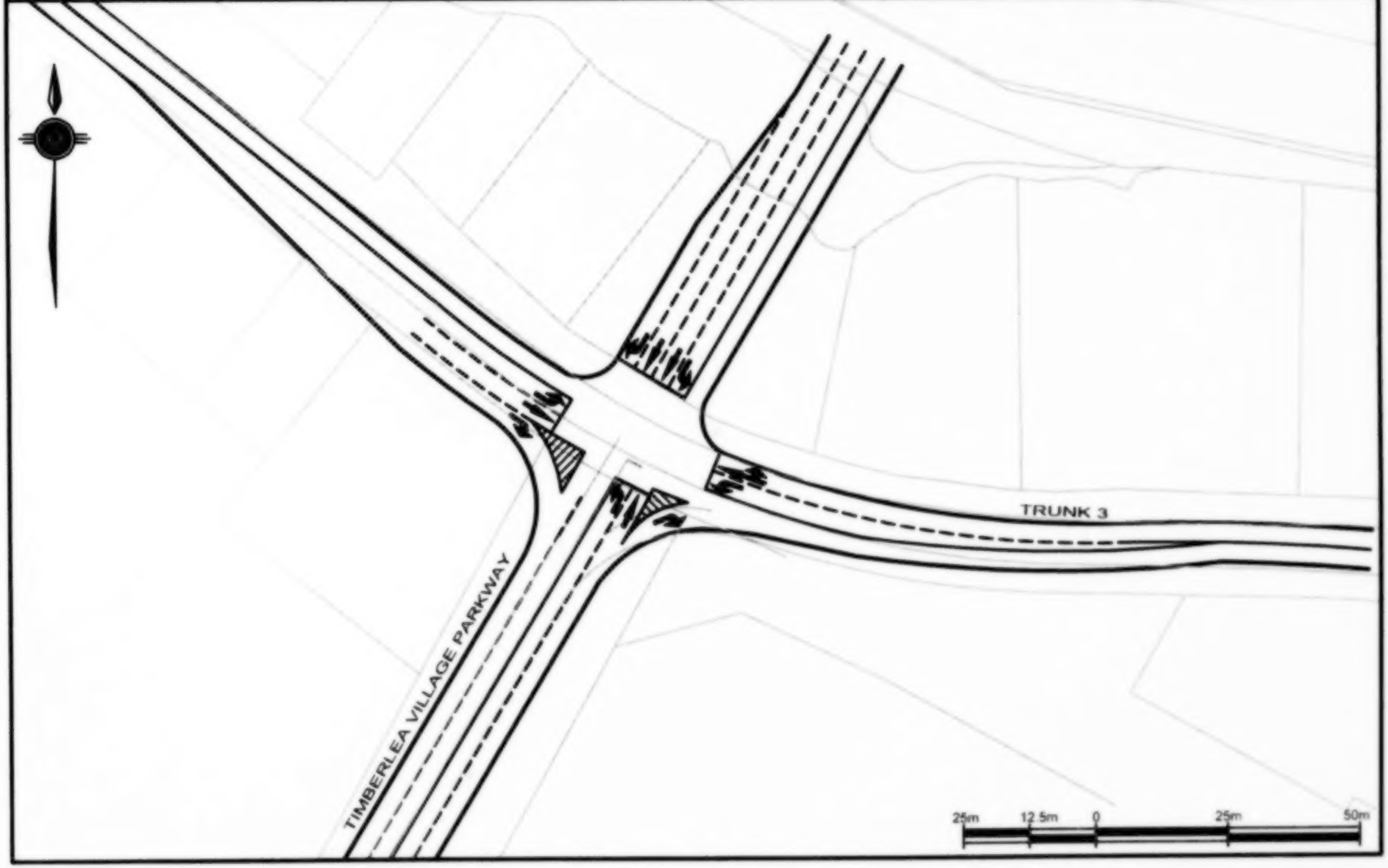
BEECHVILLE - LAKESIDE - TIMBERLEA

Title:

Exhibit 6.13

Timberlea Village Parkway at Trunk 3

SGE Acres


TRUNK 3
TIMBERLEA VILLAGE PARKWAY
25m
12.5m
0
25m
50m

6.3 Non-Structural Improvements

The analysis has resulted in a series of options that will be costly to implement. It may be argued that this is the price of progress. But it may be argued that the costs are too high, and that alternatives should be pursued, if viable. It was not the mandate to compare alternatives, however given the range of options under investigation in different parts of the world today, it is of value to document some of them and to discuss briefly how they might be employed to, at least, defer major infrastructure expenditures.

6.3.1 The HRM Tool Kit

The HRM GoPlan of the early 1990's (later expanded into the Interim Regional Transportation Strategy) endorsed TDM measures because they offered the potential for a cost effective means of reducing traffic congestion. GoPlan favoured policy measures such as an urban growth management strategy because it implied lower infrastructure costs through a better allocation of land uses and densities.

The current regional planning program, referred to as Healthy Growth for HRM, is a result of this thinking. It will seek to provide transportation guidance as part of an overall land use strategy. Specifically, the transportation component of the regional plan will recommend a combination of road improvements, transit service enhancements and other initiatives to manage transportation pressures. The goal will be to enable people and goods to move in an efficient, cost-effective and environmentally sustainable manner.

The biggest challenge of regional planning, of course, will be to establish workable policies for both developed and undeveloped areas of the Region.

GoPlan concluded that the positive effects of good planning accumulate because effective planning sets a pattern that lasts for many years. The planning decisions we make today will affect the shape and economic well being the community for years to come. The combined effect of several TDM initiatives, it was felt, could have the same benefits as any one of a number of expensive road building options. TDM policies were suggested as being most applicable to HRM. Below, this "tool kit" of policies is itemized and discussed in the context of the study area.

6.3.2 Transit

Our discussions with Metro Transit indicate the good probability that improved transit will be available in HRM under the Metro Transit Strategy (June 2002). A primary goal of the Transit Strategy is to improve service levels and ridership. Specific objectives to achieve this five-year (2002-2007) goal would include:

- Increase annual hours by nearly 50% (from 480,000 to 610,000);
- Increase ridership from 12.7 to 14 million;
- Increase the number of riders per capita from 40 to 50;
- Increase the peak market share from 6 percent to 8 percent.

To achieve these targets, the Metro Transit planners recommend that new ridership will have to come from two sources: population growth and a modal shift from car use.

Under the strategy, among other efforts Metro Transit would begin to offer peak hour suburban transit service tc areas of sufficient density and infrastructure. To be called *"Rapid -Bus"*, this major new strategy would make transit more attractive for longer commuter trips. Metro Transit would establish a series of quick, limited-stop, high quality trips and services on select corridors. Some of these routes might be seen, in fact, as precursors to commuter rail.

6.3.3 Transit Incentives

Incentives for the greater use of transit by commuters and off peak riders include fare subsidization and fare purchasing options. Fare subsidization would typically be offered by employers to encourage transit use by employees. At present, however, it is a taxable benefit and as a result it is difficult to sell to most employers (and employees). In HRM, the only employer currently supporting an internal pass program is the Halifax Herald in downtown Halifax. It does this principally because it has limited available employee parking.

The TRAX Group of the Ecology Action Centre is working with several employers to encourage alternatives to the car. The Group has working arrangements with several employers that include transit support.

Moving beyond the concept of monthly bus passes and seniors discounts, in 2002 Metro Transit was working on new products including a U-Pass for St. Mary's University. The proposed pass would be included in the student fees and provide transit for the full eight-month school year. This is a form of subsidized transit pass. If supported in a student referendum planned for February 2003, the pass would be introduced in the fall semester.

6.3.4 Pedestrian and Cycling Facility Enhancements

Sidewalks, pedestrian / vehicular separation and bicycle-friendly facilities are all included in this TDM strategy. The study area now benefits from a multi-purpose trail constructed on the former alignment of the abandoned rail line. This is an excellent resource that requires integration and connectivity to a broader network (both on-and off-road) to become identified as a reliable route. Pedestrian facilities are being improved within the study area as a sidewalk construction program continues to be implemented.
The principal weakness of pedestrian and cycling facility enhancements is their limited applicability in the winter months. These are not year-round solutions.

6.3.5 Ride sharing Programs

Such concepts as Satellite Parking Lots, Preferred Parking, Ride-matching, Parking Management and Park and Ride are recommended by HRM for use in the region. Some of these concepts such as satellite parking lots and park-and-ride facilities are intended to assist transit performance. Others, such as ride matching are intended to increase the occupancy of commuter vehicles. The Province provides one such facility within the study area at the intersection of Highway 333 and Trunk 3. An immediate opportunity for an additional facility may include the area of Exit 3.

6.3.6 Road User Policy and Vehicle Restrictions

The concept of user restrictions on some roads has been employed for several decades. These measures include bus-only lanes, high occupancy vehicle (HOV) lanes, and toll roads. Metro Transit has some bus only/priority lanes in HRM, which it finds extremely helpful in maintaining a competitive service. Metro Transit is always searching for additional such facilities. It is understood that the Lakeside branch of the CN rail system has significantly reduced rail activity following the loss of the Volvo manufacturing facility at the Bayers Lake Business Park. Should this line ever be abandoned, this alignment may have the potential as a transit priority link to the peninsula. For the foreseeable future, HRM does not intend to pursue the idea of light rail mass transit, due to costs. However, the alignment might readily be converted to a rubber-tired transit route. As a result, it should be regarded as a medium to long-term asset to the transit system. Certain parts of this route may be shared or paralleled by roads, but not to the disadvantage of transit.

To our knowledge to date no serious consideration has been given to HOV lanes. Under the concept of toll roads, GoPlan proposed the application of technologies such as the monitoring of roadway use and the generation of revenue based on individuals' use of the road. This concept of congestion or value pricing has been applied in certain markets. For example, it is currently under review for application on a national basis in the UK. Congestion pricing is based on the belief that the way we pay for road use should be more focused on payments that reflect the impact road use has on congestion and on the environment.

6.3.7 Alternative/Flexible Work Hours

This single measure – of encouraging staggered work times and flexible work hours - has the potential to add significant capacity to the existing network. Large employers employ this technique simply to reduce traffic jams in their parking lots. On a regional scale, broadening out the rush hour period from two hours to three hours could effectively add 33 percent to the roadway capacity. This reality was demonstrated during an extended transit strike in 1998. At the time it was clear that many drivers, collectively decided either to start for work earlier or later than normal to avoid the severe levels of congestion that were anticipated. It turned out that these two to three weeks were among the most pleasant in recent memory as congestion levels were notably reduced.

6.3.8 Telecommuting

Different from the approach discussed above, but with a similar result, telecommuting has the effect of reducing the number of commuters using the road at one time. Essentially, telecommuting involves working at home for some or part of the day, and utilizes modern telecommunications to stay in touch with their place of employment. Telecommuters may only travel to work on some days, or at off peak hours. Various land developers in North America have expended extra money on telecommunications infrastructure and now promote neighborhoods as being 'wired' as a means of attracting residents who are in a position to enjoy the benefits of telecommuting.

6.3.9 Intelligent Transportation Systems (ITS)

The concept of ITS has grown to major importance locally and internationally as a means of monitoring road conditions local climate and various other aspects of roadway operations and even maintenance. On commuter routes, variable message signboards may be employed to warn drivers of hazards ahead of the need to take alternate routes. Such signs are employed on the Harbour Bridges, for example. Roadway uses pricing (toll roads or congestion pricing as discussed above) would use ITS technology.

6.3.10 Regional Planning and Urban Form

It is an established truism in North America at least, that peoples' willingness to take the bus or other public transit modes is exceedingly low. In the future, this may change as Canada and other countries undertake new measures to reduce our reliance on fossil fuels. But which measures the federal, provincial and municipal governments may take, and when they may take them, are not known at present.

Joel Garreau, in his book *Edge City* (1989), has suggested (sarcastically) that the only way for mass transit to pay for itself is if there are no other alternatives available. He points out that Hong Kong has the only subway system in the world that does not require subsidies – mainly because key destinations such as the new airport and Hong Kong Island are only accessible by the subway, less efficient ferry service, or costly automobile modes.

Such a perfect situation does not exist for Lakeside Timberlea, first, because the site is not an island, and second, because roadway links to Peninsular Halifax (the primary home-to-work destination) are already available. And as was noted in Section IV, these links are not highly congested at present. But as was also noted, these links have a probability of becoming congested before buildout is reached, as not enough lane capacity will be available in the future.

Two alternatives could present themselves at (or preferably before) the point at which congestion becomes intolerable. One, additional lanes can be added to relieve the congestion. The first alternative has been the premise of the bulk of this report.

Second, an expansion of transit might be used to provide additional capacity. But simply expanding transit service without related land use policies is not productive. Paradoxically, transit might be made workable with much higher population than that currently proposed. It is a principal of transportation planning that transit use tends to rise as a function of population and density. Residents of high-density areas tend to have less need to own cars, often because the amenities they require for quality of life are situated nearby. It is not a question of affordability – one needs only to look at the high-density neighborhoods of Vancouver as proof of this. These people can use transit, walk or take taxies for short trips.

6.3.11 Conclusions and Recommendations

This section has explored a series of travel demand strategies that have been promoted by HRM as a means of lessening our dependence on the automobile. The scale of proposed developments proposed for the Governors Lake Area certainly implies that major infrastructure will be required to accommodate and facilitate the growth proposed.

However, this infrastructure is not required immediately. In the near to mid-term, alternate means to accommodate growth in travel demand should be explored.

This plan does not guarantee that increased transit service would be available within the study area. However, as such projects as Westgate come to be developed the potential demand may warrant increased service to the area. A park-and-ride facility near Exit 3 would be a valuable consideration in this regard.

Use of portions of the abandoned rail corridor (now a multi-use trail) as transit priority laneway could also be considered, especially as the Governor's Village project begins to be developed.

The presence of industrial and business parks within the study area places residential growth areas and large centres of employment in close proximity. For transit utilization and greater pedestrian activity, higher density uses should be encouraged, where possible, within an easy walk of employment areas.

The scale of proposed developments proposed for the Governors Lake Area certainly implies that major infrastructure will be required to accommodate and facilitate the growth proposed. However, this infrastructure is not required immediately, and the time between now and the projected need for upgrading (+10 years) offers an opportunity to at least defer these investments.

Deferral can be a powerful tool. It can save money and buy time. The next decade could be significant in the history of Canada as it seeks to affirm its stance on the reduction of greenhouse gas emissions. This plan, as all plans, should be subject to a cautious, balanced review. The prospect of spending a significant amount of money on infrastructure should give pause for serious reflection. During the deferral period, this proposal should be compared to the alternatives.

It is recommended that the Province and Municipality undertake an in depth analysis of the practical benefits of TDM measures with specific relevance to HRM. This analysis should include an international review of quantitative and qualitative analyses, as well as local case studies. As a growing part of the Region, the study area could provide a test case and possibly a pilot area for alternative solutions.

It is recommended that the municipality focus its planning efforts (at both the regional and district planning levels) to determining ways to ensure residential land development is truly supportive of public transit modes. This includes adjustments to zoning and densities to ensure that higher density land uses are situated adjacent to principal transit routes, including the railway corridor (abandoned and active sections).

It is recommended that in the short term, the HRM declare its interest in obtaining the active section of the corridor for transportation purposes at such time as the Chester Spur line becomes surplus to the present owner.

VII Conclusions and Recommendations

7.1 Introduction

This study focused on identifying the implications of proposed future development on the transportation network in the Governor Lake area. A key objective was to develop transportation infrastructure improvements to provide an acceptable level of safety, capacity with the construction of the proposed developments over a 20-year horizon. A functional design was also prepared for these roadway improvements. Specific tasks associated with the completion of the study included:

- Demographic analysis of existing and future development.
- Review of relevant planning documents and studies.
- Field investigations and data collection.
- A public information session.
- Computer modelling operational analysis of the Study Area Transportation Network.

7.2 Key Findings of the Analysis

From our analysis of existing and proposed development in the area, we have drawn the following conclusions:

- Current residential development levels (1996 Census) of 6,770 persons will increase to include an additional 22,000 to 23,000 persons in new residential developments
- Current commercial development includes 1,400,000 square feet with a projected additional 240,000 square feet of commercial space and an additional 300 acres of land to be developed for Business Park type uses.
- Existing development levels have 30,500 vehicle trips entering and exiting the Study Area daily. In the morning peak hour 1,375 vehicles exit the Study Area and 2,155 vehicles enter the Study Area in the afternoon peak hour.
- Full build out of the proposed developments will result in 72,300 vehicle trips entering and exiting the area daily. Peak hour movements will include5500 vehicles exiting the Study Area in the AM Peak and 6,500 vehicles entering the Study Area in the PM Peak.

With respect to impacts on the Study Area roadway network, we conclude that:

- Currently, four points of connection provided between the Study Area and the surrounding Arterial Highway system totalling six lanes of access and egress.
- Minor system operation problems presently exist at the Highway 103/Trunk 3 Interchange.
- Problematic vertical and horizontal alignments on Trunk 3 affect its traffic handling capacity and will constrain the potential for roadway improvements along with the existing residential and commercial development on this route.

- The existing Highway 103/Trunk interchange will reach capacity as development proceeds.
- The total projected volume resulting from full buildout of the proposed developments will require the construction of three additional lanes of entrance and exit capacity between the Study Area and adjacent roadway network.

7.3 Improvement Program Costs and Implementation

An implementation program and cost estimates were developed for the improvements discussed in Section 6.2. As the terms of reference identified a 20-year horizon for the transportation system analysis, it was assumed that the construction of the proposed development would occur over this time frame. The implementation timeline for the proposed improvements was based on a review of information contained in earlier Traffic Impact Studies and SGE Acres' analysis of the impacts of additional traffic growth on the Study Area roadways contained in Section 5.1.1.

7.3.1 Implementation

Previous analysis completed for developments within the Study Area (Governor's Run: Traffic Impact Analysis, May 2001-Delphi Systems Inc.) have forecast the following levels of development and supporting transportation system improvements:

- Horizon Year 2010: 60% build out of Westgate
  20% build out of Governor's Run
  and adjacent Kimberley-Lloyd Development

This would require widening of the Timberlea Village Parkway to four lanes and access from Governor's Run to the Timberlea Village Parkway/Trunk 3 intersection and the Lakeside Industrial Park.

- Horizon Year 2025: Full build out of Westgate
  75% build out of Governor's Run
  and adjacent Kimberley-Lloyd Development

At this time, it was assumed that the East Collector would be constructed. A connection from the northeast area of the Governor's Run Development to Bayers Lake Business Park along with an indirect connection between Bayers Lake and the Lakeside Industrial Park would also be constructed.

In addition to the timeline for implementation of improvements identified in previous studies, SGE Acres gave consideration to the relationship between the various proposed developments and the components of the improvement package with regards to the implementation of the following improvements:

- Highway 103/Trunk 3 Interchange (Exit 2)
  - Construction of new roadways (Ragged Lake Connector, Interchange On/Off Ramps, new Trunk 3) and construction of two overpass structures
  - Installation of traffic signals at the intersection of Chain Lake Drive and the Ragged Lake Connector

  - Installation of traffic signals at the intersection of the Ragged Lake Connector and the Highway 103 west bound on-ramp
  - Reconfiguration of the Trunk 3/Lakelands Boulevard intersection and adjustment of the signal timing and phasing plan
  - Widening of Trunk 3 east of Lakelands Boulevard
  - Widening of the Trunk 3/Route 333 intersection, and adjustment of the signal timing and phasing plan.

- Washmill Lake Court Extension / Chain Lake Drive/ Susie Lake Crescent
  - Extension of Washmill Lake Court with underpass at Highway 102
  - Reconfiguration and Widening of the Chain Lake Drive/Washmill Lake Court Intersection
  - Reconfiguration and Widening of the Chain Lake Drive/Susie Lake Crescent Intersection

- Highway 103/ Timberlea Village Parkway Interchange
  - Widening of bridge structure
  - Intersection Reconfiguration and traffic signal installation at both access ramp intersections

- Timberlea Village Parkway at Trunk 3
  - Widening of intersection approaches and installation of traffic signals

- Construction of East Collector

- Construction of Governor's Run - Lakeside Industrial Park Linkage.

- Construction of additional lane on access ramp for traffic accessing Highway 102 Inbound from Highway 103 Eastbound.

7.3.2 Costing

The costing and implementation elements of improvement plan components are discussed in more detail below. The basis for the construction cost assumptions was as follows:

- New roadway construction costs were estimated at $ 550/lineal metre for a two-lane cross section.
- Roadway widening costs were estimated at $ 472 per lane metre exclusive of fill and borrow quantities. Where required, fill and borrow quantities were also estimated on a location-specific basis.
- Costs associated with traffic signal installation were estimated $ 120,000 each.
- Costs associated with construction of grade-separated structures were estimated based on a value of $ 1,215/square meter for overpass structures. This measure includes areas associated with guide rail and sidewalks where applicable. For the ramps and approaches a value of $ 114/square meter was used measured from the outside edge of shoulder to outside edge of shoulder. These were based on figures developed by SGE Acres from information provided by TPW.
- Engineering and contingency were assumed at 15% of the construction cost.

Cost estimates for the work are provided which include the estimated construction costs, a 15% engineering and contingency allowance and 15% HST. Property acquisition costs are not included in the cost estimates. Estimated total costs including engineering, contingency and HST, but excluding property acquisition are $ 35,320,000.

Highway 103/Trunk 3 Interchange (Exit 2)

This is a major component of the overall system improvement plan providing linkages between the Study Area, adjacent sections of the 100 Series Highway Network and the core area of HRM. Individual elements of the interchange roadway network are discussed below.

New Roadway and Interchange Construction
(Exhibits 6.6, 6.8, 6.10, 6.13)

This includes the construction of the Ragged Lake Connector linking Bayers Lake and Ragged Lake Business Parks and access ramps between the Ragged Lake Connector and Highway 103. Implementation of these components should be slated to coincide with construction of the Governor's Run Development and the planned Expansion of the Bayers Lake and Ragged Lake Business Parks. This work includes the installation of traffic signals at the Chain Lake Drive and Highway 103 westbound on- ramp intersections with the Ragged Lake Connector in addition to improvements at the Trunk 3 at Lakelands Boulevard intersection.

Trunk 3 at Route 333
(Exhibit 6.7)

The westbound Trunk 3 approach would be widened to provide a dual left turn lane for traffic accessing Route 333 (Prospect Road). Implementation would be over the short-term horizon (2005) with an associated construction cost of $ 213,000.

Washmill Lake Court Extension and associated Roadway Improvements
(Exhibit 6.11)

These improvements would result in the extension of Washmill Lake Court under Highway 102 and improvements to the Chain Lake Drive at Washmill Lake Court and Chain Lake Drive at Susie Lake Crescent. Construction of these improvements should coincide with the development of the Governor's Run development. Estimated construction costs are $ 6,102,000.

Highway 102 / Lacewood Drive Interchange

Improvements planned for implementation in 2002/2003 will be sufficient to accommodate future demand in addition to our recommended improvement package.

Highway 103/ Timberlea Village Parkway Interchange
(Exhibit 6.12)

These improvements would support increased connectivity between Highway 103 and the Governor's Run and Westgate Developments, decreasing the reliance on Trunk 3. A directional ramp would be constructed for southbound traffic on the Timberlea Village Parkway to access Highway 103 eastbound. This will involve the relocation of the existing off-ramp from Highway 103 eastbound to the Timberlea Village Parkway. The estimated construction costs are $ 582,000, with completion over the long-term planning horizon.

Timberlea Village Parkway at Trunk 3
(Exhibit 6.13)

Improvements at this intersection would be required to accommodate the access to the Governor's Run Development and would include the widening of The Trunk 3 intersection approaches and installation of traffic signals. Implementation of these improvements would occur with the construction of the first phase of the Governor's Run Development. Costs of the improvements are estimated at $ 240,000.

East Collector

This roadway was initially proposed in the 1996 Traffic Management Strategy for Beechville/Lakeside/Timberlea (Streetwise Traffic Engineering, 1996) to provide a connection between the Lakeside Industrial Park and the Timberlea Village Parkway/Highway 103 interchange. Completion of the route would serve development in the area south of Trunk 3 and east of the Timberlea Village Parkway as well as providing a route for trucks accessing the Lakeside Industrial Park. Construction of this road would occur as adjacent lands are developed, likely over the longer term. Estimated construction costs for the East Collector are $ 1,500,000, with completion coincident with the connector between the Bayers Lake Business Park and Lakeside Industrial Park.

Widening of the Timberlea Village Parkway

A previous Traffic Impact Study completed for the Westgate development has identified that the Timberlea Village Parkway would require widening to a four-lane cross-section by 2010. As a result we recommend that the roadway be widened in conjunction with the completion of the full build-out of the Westgate Development. Construction costs associated with this component of the improvement plan are estimated at $ 800,000.

Governor's Run – Bayers Lake Business Park Linkage

The improvement plan provides for connectivity between the eastern portion of Governor's Run and Bayers Lake Business Park. This is accomplished by extending Susie Lake Crescent to the west to access the Governor's Run Development and having a connection from Governor's Run into Dominion Crescent, which would eventually extend along the CN Rail right-of-way and intersect with Chain Lake Drive. These improvements would be constructed to coincide with development of the Western Sections of Governor's Run and the expansion of Bayers Lake Business Park over the long term with estimated construction costs of $ 1,820,000 for a two-lane cross section width.

A summary of the recommended improvement package, implementation timing and costs is provided in Exhibit 7.1.

Exhibit 7.1 Implementation Costs

Short-term

Location	Improvement Element	Development Served	Estimated Cost
Highway 103, Exit 2 Interchange	Widen roadways at the intersection of Trunk 3/ Hwy 333 and adjust signal timing and phasing plan.	Existing Traffic	$ 213,000
		Sub-total short-term improvements	$ 213,000
Mid-term			
Timberlea Village Parkway at Trunk 3	Widen intersection approaches and installation of traffic signals.	Governor's Run Westgate	$ 240,000
Timberlea Village Parkway	Widen Timberlea Village Parkway to 4-lanes	Governor's Run Westgate	$ 800,000
Governor's Run – Bayers Lake Connector Roads	Construction of roads with 2-lane cross-section	Governor's Run Bayers Lake Expansion	$ 1,820,000
Highway 103, Exit 2 Interchange	Realign Trunk 3 and Reconfigure the intersection of Trunk 3/ Lakelands Boulevard	Business Park Linkage	$ 4,900,000
		Sub-total mid-term Improvements	$ 7,760,000
Long-term			
Washmill Lake Court Extension / Chain Lake Drive/ Susie Lake Crescent	Construct new roadway with underpass at Highway 102 Reconfigure and widen intersections: - Chain Lake Drive at Washmill Lake Court - Chain Lake Drive at Susie Lake Crescent	Governor's Run Bayers Lake	$ 5,830,000 $ 272,000
East Collector	Construct the East Collector between the Lakeside Industrial Park and Timberlea Village Parkway	Development of adjacent lands	$ 1,500,000
Highway 103/ Timberlea Village Parkway Interchange	Provide directional ramp to permit southbound traffic on the Timberlea Village Parkway to access Highway 103 eastbound Install Traffic Signals at intersection of westbound off-ramp and Timberlea Village Parkway	Westgate Governor's Run	$ 602,000
Highway 103, Exit 2 Interchange	Construct Ragged Lake Connector and associated interchange ramps Traffic Signals: - Chain Lake Drive at Ragged Lake Connector - Ragged Lake Connector at Highway 103 WB On-Ramp	Business Park Linkage Westgate	$ 10,290,000 $ 240,000
Highway 103/ Highway 102 Interchange	Construct additional lane on access ramp to serve traffic accessing Highway 102 Inbound from Highway 103 Eastbound	All developments in Study Area	$ 400,000
		Sub-total long-term Improvements	$ 19,134,000
		Total construction costs 15% Engineering and Contingency 15% HST	$ 27,107,000 $ 4,066,050 $ 4,675,958
		Total Estimated Cost	***$ 35,385,000 (rounded)***

Appendix A

Terms of Reference

NOVA SCOTIA

Department of Finance
Procurement Branch - Public Tenders Office

6176 Young Street
Suite 100
Halifax, Nova Scotia
B3K 2A6

Telephone (902) 424-3333
Facsimile (902) 424-0608

REQUEST FOR PROPOSALS
For
Governor Lake Area Transportation Study
Department of Transportation and Public Works
Tender No. 60092942

Request for Proposal Issue Date: ***Wednesday, July 11, 2001***

Responses to this Request for Proposal must be Received in the Office of:
Public Tenders Office, 6176 Young Street, Halifax, NS, B3K 2A6

Not later than
Closing Date and Time: *Wednesday, August 1, 2001; 10:00am, local time*
Public Opening: *Wednesday, August 1, 2001; 10:30am, local time*

Department Contact:
Michael Croft, P.Eng.
Tel. (902)424-3548
Fax. (902)424-0571

Facsimile bids will not be accepted.

If conflicting information occurs between this page and the remainder of the document, this page is considered correct.

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1.0 Background

The Governor Village Concept Master Plan Area (see attached figure) has seen tremendous growth over the past 10 years, and further development potential is significant. Future development in this area includes Governor Village, Westgate (formerly Timberlea Village), Beechville Estates, Bayers Lake South, continued expansion of the Bayers Lake Business Park, and infilling of vacant lands. Proposed development land uses include low to medium density residential, commercial, light industrial, and recreational. The residential component has the potential to increase the population of this area by 15,000 over the next 20 years. Planned development, combined with background traffic growth, will undoubtedly stress sections of the existing roadway infrastructure to the point of failure during peak travel times.

Some changes have been made to the roadway system in this area in recent years, including the construction of the Otter Lake Interchange on Highway 103, the Timberlea Village Drive (West Collector Road) from Trunk 3 to Highway 103, and the twinning of Highway 103 from the Beechville Interchange to the Otter Lake Interchange. Although these changes have increased service levels considerably, areas of heavy congestion still exist.

One area of the existing roadway infrastructure requiring significant upgrading to handle anticipated growth is the Beechville Interchange and connecting roadway system including Trunk 3 and Rte. 333. The Beechville Interchange is located very close to the Highway 102/103 interchange, its design is unorthodox and not well suited to handle large volumes of traffic, and connections to the secondary road network are awkward and potentially confusing.

To ensure orderly and efficient growth within and adjacent to the Governor Village Concept Master Plan Area, an adequate secondary road system of urban collectors and arterial highways must be developed that are well connected to a 100 series freeway system operating at a high level of service.

2.0 Objective

The primary objectives of this study are to:

1. **Conduct a comprehensive transportation study to identify the roadway infrastructure required to provide an acceptable level of safety, capacity, and speed within the study area, based on projected travel demands over the next 20 years. Although the study will consider required new roadways and connections within proposed development areas, the primary focus of the study will be required changes to the existing highway infrastructure.**

2. **Prepare functional design plans for all proposed highway infrastructure improvements.**

3.0 Study Area

The focus of the study will be the Governor Village Concept Master Plan Area and surrounding road network as shown on the attached figure. Although general comments regarding the adequacy of the Highway 102 Lacewood Interchange are expected, a detailed analysis of this area is not intended to be included in this study. A broader focus will be required to assess the traffic impacts of overall growth in the region. The study horizon will be 20 years.

4.0 Duties of the Consultant

1. Meet with the project management team as per the schedule specified in Section 7.0 (Meetings and Reports).

- Familiarization with the study area including, but not necessarily limited to, existing highway infrastructure, existing development, zoning, land ownership, approved and proposed developments, proposed highway alignments, terrain and soil conditions.

- Review all past transportation and land use studies within the study area.

- Within the first month of starting the project, organize and conduct an information session to present the goals of the study and gain public and business input.

- Collect all road network, traffic, and demographic data (including projections of development) needed to perform the required analysis and to develop growth projections and estimates of future traffic volumes for the 20 year horizon.

- Generally assess the system of collector and arterial roadways proposed to service undeveloped land. This assessment shall consider street hierarchy, functionality, design requirements, capacity, connectivity between developments, access to adjacent lands, and access to the existing roadway system.

- Assuming no improvements to the existing highway network within the study area, identify existing and estimated future levels of service and safety on the existing roadway network. Areas with moderate to severe deficiencies, existing or projected, should be highlighted.

This analysis shall include, but not necessarily limited to, the following roadway infrastructure:

- Highway 102, Lacewood Drive to Highway 103
- Highway 103, Otter Lake Int./c to Highway 102 (including all interchanges)
- Trunk 3, Greenwood Heights to Route 333 (including all major intersections)
- Route 333, Exhibition Park to Trunk 3

- Identify the most cost effective road network upgrades (geometric improvements, new alignments, traffic control measures, etc.) to eliminate existing and predicted future deficiencies within the study area. Emphasis shall be placed on the Beechville Interchange and connections to Route 333 and Trunk 3.

- Investigate the potential for travel demand management in reducing traffic volumes including public transit improvements, bicycle and pedestrian facilities.

- Prepare an interim report to include a summary of all work completed to this point and a recommended upgrading strategy for providing acceptable levels of service within the study area. The upgrading strategy shall include phasing, time frames for implementation, and preliminary cost estimates. The interim report shall be presented to the project management team.

- After acceptance of the upgrading strategy by the project management team, prepare functional designs for the proposed improvements. The functional designs will adhere to TPW and HRM design standards and specifications.

- Prepare a final report.

- After acceptance of the final report by the project management team, organize and conduct a public information session to present the study recommendations and functional plans.

5.0 Duties of TPW

- Meet with the Consultant on an arranged schedule.

- Provide the Consultant with any available documentation (reports, studies, plans, etc.) required to complete the project.

6.0 Guidance

A project management team will administer the technical and analytical work of the Consultant. The team will consist of representatives from TPW and HRM . The Consultant will report to the project management team chair, who will be responsible for overall administration of the study.

Acceptance and approval of the work will take place after the project management team has been satisfied that the requirements, as specified in the contract, have been met.

7.0 Meetings and Reports

The Consultant shall meet with the project management team for the project initiation, the interim meeting, the draft final report review, and other meetings as required during the duration of the project. All meetings will be held in Halifax, Nova Scotia. The Consultant shall meet with the project management team within two weeks of notification of award of contract. The initial meeting with the Consultant will be to finalize the study requirements, data requirements and the methodologies to be used.

The following reports shall be required:

Five (5) copies of the interim report. Required copies of the interim report shall be submitted 5 working days prior to the interim meeting.

Five (5) copies of a draft final report for the Study must be submitted for comment and possible amendments before the final version is submitted. The Consultant must be prepared to submit a second draft if requested. Required copies of the draft final report shall be submitted 5 working days prior to the review meeting.

Twenty (20) bound copies and one unbound copy of the final report. The Consultant shall also have a copy on hand should additional copies be required at short notice. The Consultant shall provide one electronic copy of the final report on CD compatible with WordPerfect 6.1 including all plans (compatible with AutoCad 2000), tables, diagrams, figures and pictures. All copies of the draft and final report shall be on letter size paper and appropriately titled. The final report shall include an executive summary and a list of references. All reports shall contain copies of supporting plans and figures. The Terms of Reference shall be attached as an appendix to the final report.

8.0 Study Schedule

The Consultant shall meet with the project management team within two weeks of notification of award of contract. The study shall be completed and the required copies of the final report presented within six (6) months of award of contract.

9.0 Ownership of Information

The Consultant agrees that all information collected, materials gathered and reports produced shall be the property of the Province of Nova Scotia. The Consultant shall not be permitted to publish or in any way use said information without the expressed prior approval of TPW.

All documents, including proposals, submitted to the Province are subject to disclosure under the Nova Scotia Freedom of Information and Protection of Privacy Act. By submitting a proposal, the proponent thereby agrees to public disclosure of its contents. Any information the proponent considers 'personal information' because of its proprietary nature should be marked as "confidential", and will be subject to appropriate consideration as defined within the Nova Scotia Freedom of Information and Protection of Privacy Act.

Information pertaining to this competition or any Department obtained by the proponent as a result of participation in this project is confidential and must not be disclosed without written authorization from the Province.

10.0 Consultant Expertise/Eligibility

The project team shall have experience and knowledge in land use and transportation planning as well as traffic engineering and highway design. The engineering principal shall be a registered member of the Association of Professional Engineers of Nova Scotia (APENS).

Prospective proponents are not eligible to submit a proposal if current or past corporate or other interests may, in the Province's opinion, give rise to a conflict of interest in connection with this project.

The successful proponent may be required to demonstrate financial stability and may be required to register to conduct business in Nova Scotia.

Occupational Health and Safety

The contracted party must have either a Certificate of Recognition issued jointly by the Nova Scotia Department of Labour and an occupational health and safety organization approved by Nova Scotia Department of Labour, or the contracted party must have a Letter of Good Standing from an occupational health and safety organization approved by Nova Scotia Transportation and Public Works indicating that the contracted party is in the process of qualifying for the Certificate of Recognition.

The successful bidder will be expected to develop a safety plan for the project, to be reviewed by TPW. This plan must deal with hazard recognition, assessment and control, provision of first aid services, and handling of emergencies and it must meet all requirements prescribed by the Occupational Health and Safety Act and regulations.

Workers Compensation

The successful bidder must provide proof that they have either:
i) Registered with the Workers' Compensation Board and are in good standing (for at least the duration of this project), or
ii) Received a letter from the Workers' Compensation Board stating that the type of work they are undertaking does not meet their criteria for required coverage.

11.0 Proposal Requirements

Failure to provide information outlined in this section may result in disqualification.

Five (5) copies of your proposal (fax copies are not acceptable) are to be delivered by 10:00 am local time, ***Wednesday, August 1, 2001*** to:

Public Tenders Office
6176 Young Street, Suite 100
Halifax Nova Scotia
B3K 2A6
Tender: 60092942

Proposals and their envelopes should be clearly marked with the name and address of the proponent, the Tender number, and the project or program title. A public opening will be held on, Wednesday, August 1, 2001 at 10:30 am local time at the Public Tenders Office. Late proposals will not be accepted and will be returned to the proponent.

Proponents are solely responsible for their own expenses in preparing, delivering or presenting a proposal and for subsequent negotiations with the Province, if any. Proposals must be open for acceptance for at least 90 days after the closing date. Upon acceptance, prices will be firm for the entire contract period unless otherwise specified.

To facilitate efficient review of the proposals, proponents are requested to use the following format. The proposal shall be organized into four chapters and such chapters limited where indicated.

1 Introduction

This chapter shall include, but not necessarily be limited to, background information, a description of the study area, and understanding of the project and its objectives, including potential key issues.

2 Qualifications

This chapter shall include, but not necessarily be limited to:

- Company/companies corporate profile, client references, and the proposed team members. Corporate information not relevant to the proposed project is not necessary, however may be included in an Appendix if the Consultant feels it appropriate.

- A summary of relevant company experience within the past 10 years including dates projects were worked on. This shall be a maximum of three pages.

- A summary of project team member experience in areas related to these terms of reference. This summary shall be a maximum of one page per team member, focusing or the team member's relevant experience. The role of each team member in the study shall be clearly explained. Curricula vitae of team members, preferably outlining only relevant experience, shall be included in an Appendix.

3 Methodology

This chapter shall include, but not necessarily be limited to:

- A list of all information and data sources available to the Consultant and expected to be used in the Study.

- A detailed work plan, identifying planned field work, and including intended approach, methodology and schedule for the study.

- A draft table of contents for the report.

- A concordance table (or similar) linking proposal to this RFP.

4 Project Management

This chapter shall include, but not necessarily be limited to:

- A discussion of quality assurance/quality control, cost control, scheduling, insurance/ and safety certification. Copies of certificates are not required as part of the proposal, but shall be provided by the successful Consultant upon award of the contract.

- Number of person-days for each team member by task assigned to the project. For consistency, the basis of remuneration will be per 8 hour day for all team members.

One copy of the cost proposal shall be provided, to be separately sealed in an envelope, including labour costs, related expenses, printing costs and professional services obtained outside of the firm. In order to assess level of effort, time commitments for all team members (excluding labour costs) shall be included in the main body of the proposal. Prices quoted are to be in Canadian dollars and exclusive of federal and provincial taxes. Expenses shall not exceed the Nova Scotia provincial rates ($0.315/km, breakfast $6.00, lunch $7.00, supper $13.50, incidentals $4.00 per night)

By submitting a proposal, the proponent warrants that all components required to deliver the services requested have been identified in the proposal or will be provided by the Consultant at no additional charge. The technical proposal must be signed by the person(s) authorized to sign on behalf of the proponent and to bind the proponent to statements made in response to this Request for Proposal.

12.0 Liability for Errors

While considerable effort to ensure the accuracy of the information in this Request for Proposal has been made, the information contained in this Request for Proposal is supplied solely as a guideline to Proponents. The information is not guaranteed or warranted, nor is it necessarily comprehensive or exhaustive.

13.0 Extra Work

The Consultant may be required to undertake additional work not specified in the contract. Prior to starting this additional work, the Consultant shall submit a detailed breakdown of the costs, including all expenses, to complete the extra work and obtain written approval from the project management team.

14.0 Request for Proposal Amendments

All proponents will be notified by the Public Tenders Office regarding any changes made to the Request for Proposal or any appendices or any change in the closing date or time. It is the responsibility of the proponent to ensure they have received all amendments. When these changes occur within five government business days of the close of the proposal, the proposal closing date will be extended to allow for a suitable number of bid preparation days between the issuance of the change and the closing date. All amendments must accompany each proposal. Proposals that do not contain all the amendments may be immediately returned and the proponent eliminated from further consideration.

15.0 Payment Schedule

Payments for professional services rendered will be made monthly in arrears upon receipt of invoices detailing progress work completed, and subject to the following conditions;

(a) Monthly payments will be issued for up to 90 % of the amount invoiced. The remaining amount will be paid upon completion of and acceptance of the work, as indicated in (b), and;

(b) The total of such payments is not to exceed 80% of the fixed price for the contract. The remaining 20% will be paid upon acceptance of the final report by the project management team.

(c) Receipts shall be provided for all expenses if requested.

The Consultant is expected to provide a level of service consistent within a budget of $75,000.

16.0 Evaluation of Proposals

Proposals shall be evaluated based on the "Government Procurement Process: Architects and Professional Services" (June 15, 1998).

All proposals will be initially assessed based on the experience and expertise of the project team. Any proposals not meeting minimum qualifications will not be evaluated further.

The criteria for evaluating proposals, based on technical and managerial merit, will be the following:

- Experience and expertise of the consulting firm on similar projects.	5 points
- Qualification and experience of team members on similar projects.	20 points
- Understanding of project and objectives.	20 points
- Proposed methodology and approach.	20 points
- Quality of the proposal.	15 points
- Local knowledge and content.	5 points

After meeting initial qualifications, proposals will be evaluated on the basis of their technical and managerial merit and then on the basis of price. The technical submission shall be rated as shown above, out of 85 points, and the remaining 15 points shall be allotted based on price. Only those proposals achieving an aggregate score of 68/85 (80%) or greater will have their sealed cost envelopes opened. The lowest price shall be awarded 15 points (all prices within 5% will receive the same price points). The next lowest price (beyond 5%) will receive 12 points. Points for other submissions will be assigned with 3 fewer points for each successively higher priced price proposal. But again, each time the same score will be awarded if successive prices are within 5% of the last highest price. The proposal with the highest total points will be awarded the contract. Proposals not meeting the required 68/85 will have their unopened cost envelopes returned.

Notwithstanding the technical/managerial and price scores, TPW reserves the right to reject any proposal where prices are deemed unreasonable relative to other prices bid, typically a 25% variance from the average qualified bid (excluding the bid in question).

TPW reserves the right to negotiate any or all conditions of the Consultant's proposed work plan and reject all submitted proposals. Unsuccessful proponents may request a debriefing meeting following execution of a contract with the successful proponent.

17.0 Contract Procedures

Notice in writing to a proponent of the acceptance of its proposal by the Province and the subsequent full execution of a written contract will constitute a contract for the goods or services, and no proponent will acquire any legal or equitable rights or privileges relative to the goods or services until the occurrence of both such events.

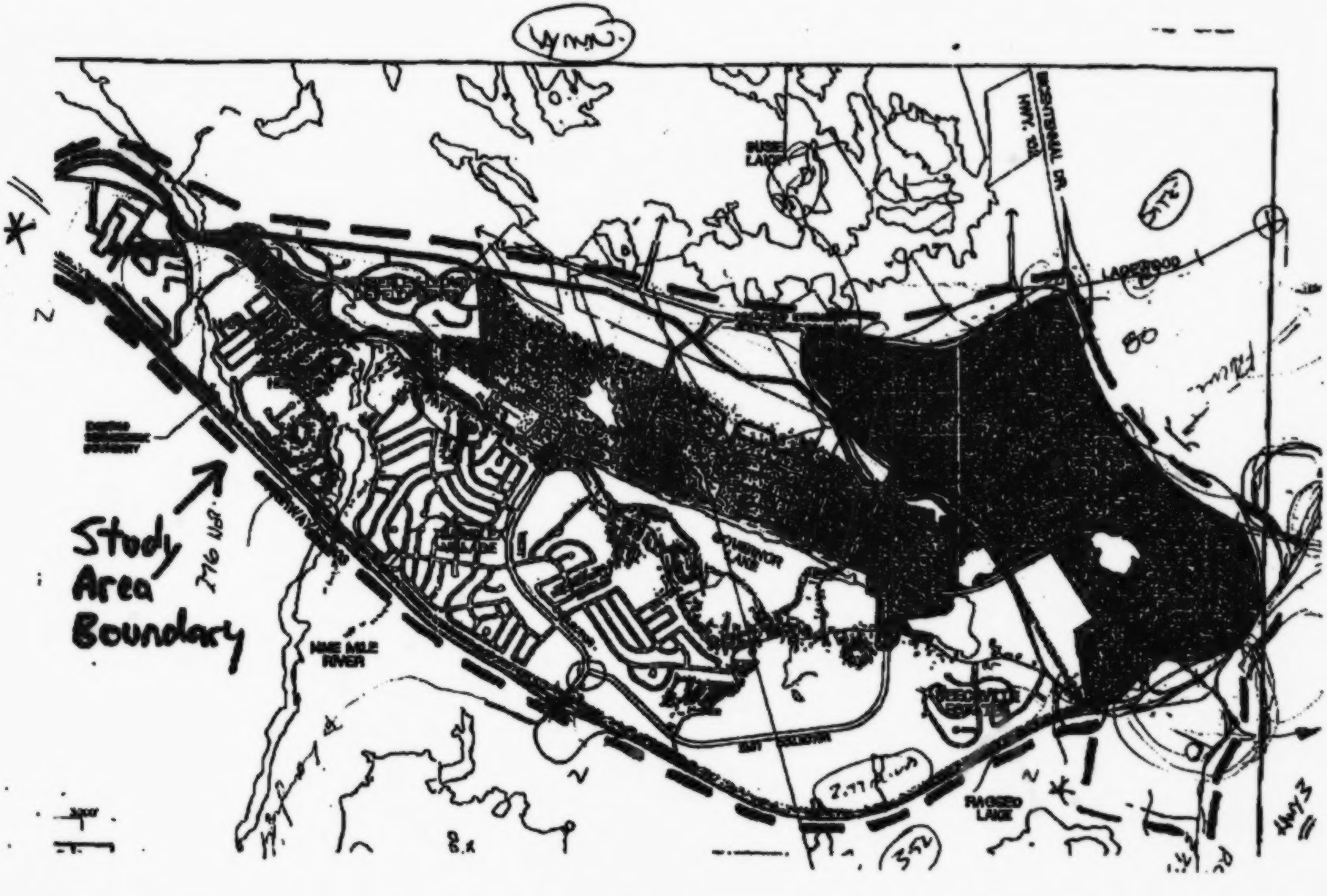
If a written contract cannot be negotiated within thirty (30) days of notification of the successful proponent, the Province may, at its sole discretion at any time thereafter, terminate negotiations with that proponent and either negotiate a contract with the next qualified proponent or choose to terminate the Request for Proposal process and not enter into a contract with any of the proponents.

18.0 Inquiries

All enquiries related to this Request for Proposal are to be directed to the following person. Information obtained from any other source is not official and may be inaccurate. Enquiries and responses may be recorded and may be distributed to all proponents at the Province's option.

Department Contact:
Michael Croft, P.Eng. (Project Management Team Chair)
Infrastructure Planning Engineer
Telephone: 902-424-3548
Fax: 902-424-0571
Email: croftmi@gov.ns.ca

G:\[illegible]STUDIES\ROADS\[illegible] study.fp

Wynn
RUSSE LAKE
HWY. 102
BICENTENNIAL DR.
2TC
LAKEWOOD
80
Future
Study Area Boundary
716 UBP.
NINE MILE RIVER
GOVERNOR LAKE
RAGGED LAKE
2.77 units
352
Hwy 3
8.x

Appendix B

Solutions Proposed in Earlier Reports

Existing reports discussed in Section 1.3 contained proposed solutions to the specific problems that were identified in the respective study. Given that the majority of these studies dealt with specific components of the transportation network or a specific proposed development, the proposed solutions are not comprehensive in nature. However, these proposed solutions do provide an initial basis for components of a comprehensive improvement package for the area. Recommended solutions contained in these reports are summarized in the following table.

Exhibit B1 Proposed Improvements (Earlier Reports)

Title	Date	Client/Consultant	*Recommended/Implemented Improvements*
Traffic Impact Study: Clayton Park West Phase 4	July 1999	Prepared by ARTM for Clayton Developments Ltd	• Signals were installed at Fairfax and Parkland Drive intersections of Lacewood Drive
Planning for Western Common	February 1999	Prepared by EDM for Halifax Regional Municipality	• an extension of Lacewood Drive providing a connection the Otter lake interchange • a grade-separated connection between the Ragged Lake and Bayers Lake business park areas
Bayers' Lake Interchange Transportation Study	March 1999	Prepared by ARTM/Beasy Nicoll for Nova Scotia Department of Transportation and Public Works (TPW)	Short-term: • widen Lacewood Drive from 4 to 6 lanes • install traffic signals at the southbound ramp intersection • make provisions for widening to 8 lanes under the overpass • widen exit ramps should be widened to 2 and 3 lanes • close roadway median on Lacewood Drive at Fairfax Drive • plan for a connection between Lacewood Drive and Main Street/Northwest Arm Drive via Parkland Drive South to distribute traffic and provide relief to Lacewood Drive • plan for linkage from the Business Park to Parkland Drive South via a new road under Highway 102 at Susie Lake Crescent. Long-term: • widening Lacewood Drive to 8 lanes, in the area of the interchange • replacing the left turn movement from Lacewood Drive (called Timberlea Drive on the west side of Highway 102) to Chain Lake Drive with a grade separated directional ramp (when Timberlea Drive) • creation of one or more intersections west of Chain Lake Drive on Timberlea Drive to provide additional access to the Business Park
Westgate Proposed Commercial Development Traffic Impact Analysis	September 2000	Delphi Systems for Nine Mile River Investments Inc.	• widen Timberlea Village Parkway from 2 to 4 lanes with appropriate auxiliary turning lanes within 10 years (full-build out) • install signals on Timberlea Village Parkway at the commercial development driveway • add a stop sign at the northbound Highway 103 exit ramp (as a preventative measure to slow exiting traffic on the right hand turn off the ramp). • examine sight distances at the commercial driveway, as they may be deficient

Exhibit B1 Proposed Improvements (Earlier Reports)

Title	Date	Client/Consultant	Recommended/Implemented *Improvements*
Traffic Management Strategy: Beechville/Lakeside/Timberlea	April 1996	Prepared by Streetwise Traffic Engineering for Halifax County Municipality, Nova Scotia Department of Transportation and Communications	• Construction of an interchange on Highway 103. • Construction of the West Collector (Timberlea Village Parkway) • Construction of East Collector – extension of West Collector eastward to connect with Route 3 at the intersection of Lakeside Park Drive. • Construction of a bridge over the Nine Mile River and extension of Eisener Avenue to provide indirect connection to West Collector. • Designation of land in Timberlea Village for a Transit Terminal to be served by a future express transit route between the core area and Tantallon. • Construction of a connection between the Lakeside Industrial Park and Bayers Lake Business Park to link the two parks and provide a connection between Trunk 3 and Highway 102. • Twinning of Highway 103 east of the proposed interchange. • Construction of left turning lanes at the following locations and growth horizons along Trunk 3: Glenforest 30 years (25 m), Brentwood 15 years (25m), Parkdale 15 years (15m) 30 years (25 m), Greenhead 15 years (25m) • the Municipality should take the necessary steps to allow it to assess a transportation surcharge on any new development in the study area • internal road systems in future developments be subject to standards regarding access onto the East and West Collectors and onto Trunk 3 (inclusion of left-turn storage lanes and traffic signals) • limit access to commercial establishments, where practical along Trunk 3 and make provisions for the accommodation of pedestrians and turning traffic • greater consideration of internal walking and cycling trails to reduce local vehicle trip in future developments • development of a multi-use trail along the existing abandoned railway corridor.
Governor's Run Traffic Impact Study	May 2001	Delphi Systems Inc.	Route 3 at Timberlea Village Parkway • Install signals (required by 2010 due to background growth) • Construct separate left and right turn lanes on the Route 3 eastbound approach and left turn lanes on the northbound and westbound approaches in conjunction with signalization (development related) Route 3 at Lakeside Park Drive • Construct separate turning lanes on Route 3 approaches • Widen Route 3 to four lanes east of the Lakeside Park Drive intersection Beyond the 10 year horizon, consideration should be given to widening Route 3 east of Lakeside Park Drive

Appendix C

Questionnaire

PASS-BACK QUESTIONNAIRE

Governor's Lake Transportation Study

Beechville-Lakeside-Timberlea
June 19, 2002

Thank you for taking time to visit and complete this questionnaire to describe your concerns for traffic congestion, safety and other related problems in the Beechville-Lakeside-Timberlea area. Public consultation and public input are important to understanding local traffic problems and concerns, so that we can properly evaluate them and recommend solutions.

1. Name (Optional):______________________________Address:______________________________
2. Postal Code_______________________; Phone Number___________________________________

3. Do you live, operate a business, or own property in the study area? Yes___ ; No ___.
   What is the use of this property? Home___; Business___; Other__________________
   Approximate location (Civic No. or business name) _______________________________________

4. Having reviewed the materials on display tonight, what is your **number one traffic concern** relative to this study? You may point this out by circling it the map on the other side of this page.
   ____
   ____

5. What **other concerns** do you have that relate to area traffic problems?____
   ____
   ____

6. Please describe any thoughts, plans or recommendations that you have as solutions to these concerns.
   ____
   ____
   ____

6. Did this Public Information Session provide the information you needed or expected? ___Yes; ____No? What additional information would have been wanted today? ____
   ____
   ____

7. Please add any additional comments you may have.
   ____
   ____
   ____

SGE Group Inc,
Suite 1009, 1809 Barrington Street
HALIFAX NS B3J 3K8
Telephone: (902) 421-1065; FAX: (902) 429-3525

FACT SHEET

Governor's Lake Transportation Study

Beechville-Lakeside-Timberlea

June 19, 2002

- The Beechville-Lakeside-Timberlea area was first settled around 1816 and it had a current (1996) population of about 6,800.
- The study area comprises over 1,500 hectares (3,700 acres) of existing and potential development lands. It includes the area as well as lands to the north of Governor's Run that are presently outside the serviceable area boundary of HRM.
- The community of Beechville-Lakeside-Timberlea has experienced significant growth in the last decade and there is a potential for continued growth in the next decade and beyond.
- The long term potential for growth suggests a tripling in the number of people living in the study area over the next 25 years.
- The eastern end of the community has experienced significant growth related to commercial development with the construction of over one million square feet of commercial space in the Bayer's Lake "Power Centre". This area comprises over 230 hectares (580 acres) with a potential expansion capability to 500 hectares (1,300 acres).
- HRM's Corporate Real Estate Services division reports that "while it is not anticipated that the Park will expand in the near future, long-range plans include linking Lakeside with Bayers Lake Business Park."
- With the rapid residential and retail commercial growth in the study area, roadways significant congestion problems and travel delay. There is potential for significantly increased demand on the roadway systems as a result of future development.
- Our preliminary assessment indicates that residential uses have the potential to create approximately 40,000 to 50,000 more trips per weekday 25 years from now (at full buildout).

Against the background outlined above, the study will address transportation system needs in the study area resulting from current and proposed development in the area. The broader system issues have arisen due to demands from the new developments. The challenge is to provide a comprehensive assessment of current and future travel demand to ensure that the capacity of the regional roadway network can support the development potential. The recommendations are likely to focus on means to ensure a transportation system that offers:

- •an adequate secondary road system of urban collectors;
- •suitable connection capacity to the arterial highways; and
- •effective linkages from the 100 Series freeway system to the HRM roadway network.

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June 19, 2002

Appendix D

Traffic Volumes at Intersections Base Case (Adjusted to 2002)

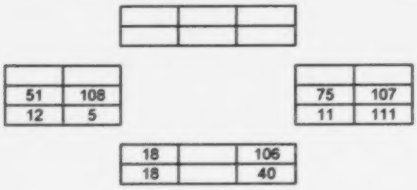
Governor's Lake Adjusted Traffic Volumes

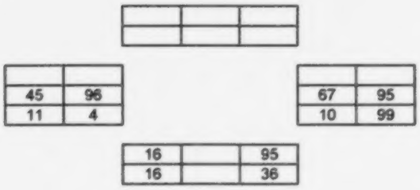
Fraser Road @ Trunk #3

Date of Count: August 22, 2001

TPW 0.87
Growth 2.50%

Adjusted to June 2002


51 108
12 5
75 107
11 111
18 106
18 40

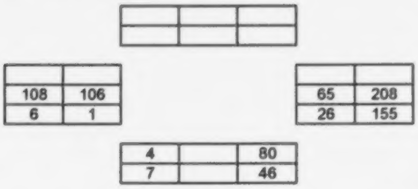

45 96
11 4
67 95
10 99
16 95
16 36

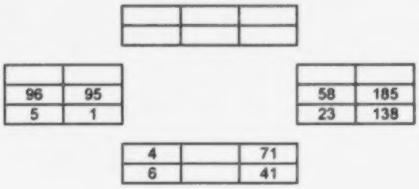
Roland Avenue @ Trunk #3

Date of Count: August 21, 2001

TPW 0.87
Growth 2.50%

Adjusted to June 2002


108 106
6 1
65 208
26 155
4 80
7 46

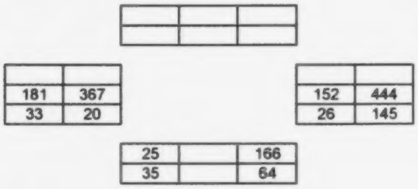

96 95
5 1
58 185
23 138
4 71
6 41

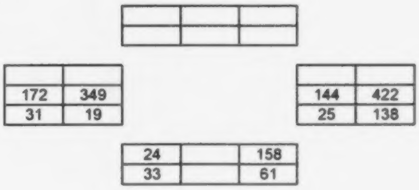
Maplewood Drive @ Trunk #3

Date of Count: June 12, 2002

TPW 0.95
Growth 0.00%

Adjusted to June 2002


181 367
33 20
152 444
26 145
25 166
35 64

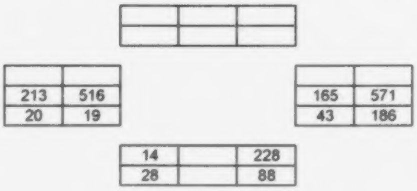

172 349
31 19
144 422
25 138
24 158
33 61

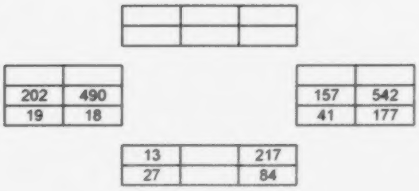
Brentwood Avenue @ Trunk #3

Date of Count: June 12, 2002

TPW 0.95
Growth 0.00%

Adjusted to June 2002


213 516
20 19
165 571
43 186
14 228
28 88

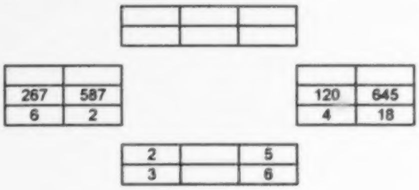

202 490
19 18
157 542
41 177
13 217
27 84

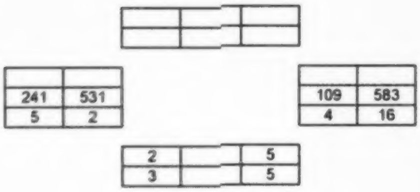
Riverview Drive @ Trunk #3

Date of Count: July 26, 2001

TPW 0.88
Growth 2.75%

Adjusted to June 2002


267
587
6
2
120
645
4
18
2
5
3
6

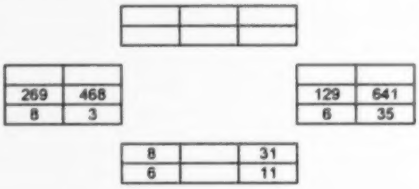

241
531
5
2
109
583
4
16
2
5
3
5

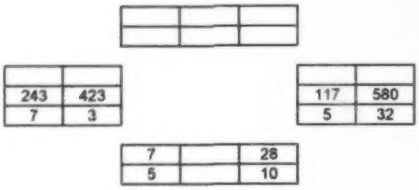
Devonshire Drive@ Trunk #3

Date of Count: July 22, 2001

TPW 0.88
Growth 2.75%

Adjusted to June 2002


269
468
8
3
129
641
6
35
8
31
6
11

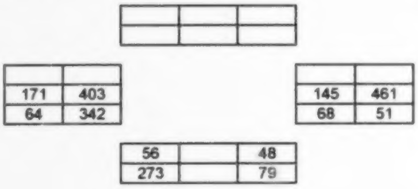

243
423
7
3
117
580
5
32
7
28
5
10

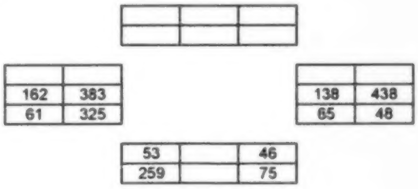
Timberlea Village Parkway @ Trunk #3

Date of Count: June 10, 2002

TPW 0.95
Growth 0.00%

Adjusted to June 2002


171
403
64
342
145
461
68
51
56
48
273
79

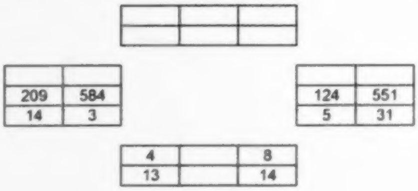

162
383
61
325
138
438
65
48
53
46
259
75

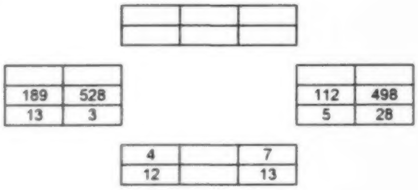
Parkdale Avenue @ Trunk #3

Date of Count: July 24, 2001

TPW 0.88
Growth 2.75%

Adjusted to June 2002


209
584
14
3
124
551
5
31
4
8
13
14

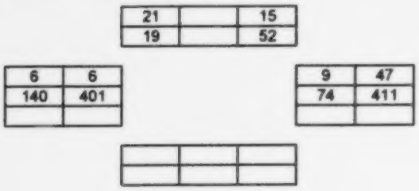

189
528
13
3
112
498
5
28
4
7
12
13

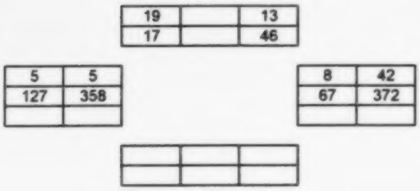
Governor's Lake Drive @ Trunk #3

Date of Count: August 27, 2001

TPW 0.87
Growth 2.50%

Adjusted to June 2002


21 15
19 52
6 6
140 401
9 47
74 411

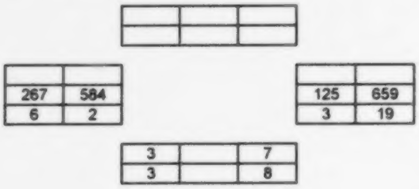

19 13
17 46
5 5
127 358
8 42
67 372

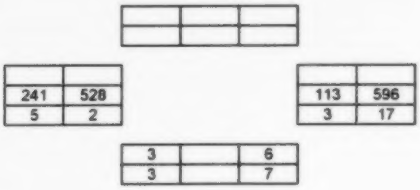
Oliver Street @ Trunk #3

Date of Count: July 17, 2001

TPW 0.88
Growth 2.75%

Adjusted to June 2002


267 584
6 2
125 659
3 19
3 7
3 8

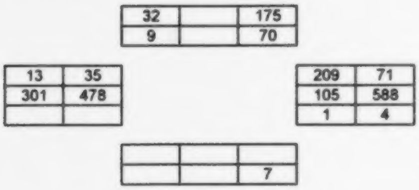

241 528
5 2
113 596
3 17
3 6
3 7

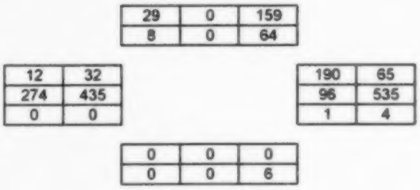
Lakeside Park Drive @ Trunk #3

Date of Count: July 4, 2002

TPW 0.91
Growth 0.00%

Adjusted to June 2002


32 175
9 70
13 35
301 478
209 71
105 588
1 4
7

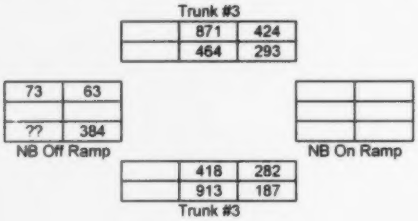

29 0 159
8 0 64
12 32
274 435
0 0
190 65
96 535
1 4
0 0 0
0 0 6

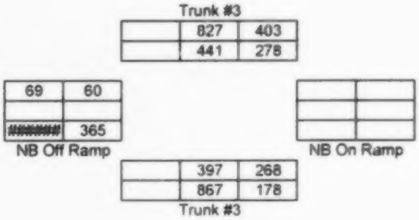
Highway 103 On/Off Ramp @ Trunk #3

Date of Count: June 13, 2002

TPW 0.95
Growth 0.00%

Adjusted to June 2002


Trunk #3
871 424
464 293
73 63
?? 384
NB Off Ramp
NB On Ramp
418 282
913 187
Trunk #3


Trunk #3
827 403
441 278
69 60
###### 365
NB Off Ramp
NB On Ramp
397 268
867 178
Trunk #3

Prospect Road @ Trunk #3

Date of Count: June 12, 2002

TPW 0.95
Growth 0.00%

Trunk #3

700	588	
147	618	

352	445
215	292

Prospect Rd

74	324	
527	918	

Trunk #3

Adjusted to June 2002

Trunk #3

665	559	
140	587	

334	423
204	277

Prospect Rd

70	308	
501	872	

Trunk #3

Costco/Kent Driveway @ Chain Lake Drive

Date of Count: June 11, 2002

TPW 0.95
Growth 0.00%

Chain Lake Dr.

88	697	168
30	509	48

201	109
29	3
53	12

Kent

27	138
4	26
6	47

Costco

31	177	6
38	897	25

Chain Lake Dr.

Adjusted to June 2002

Chain Lake Dr.

84	662	160
29	484	46

191	104
28	3
50	11

Kent

26	131
4	25
6	45

Costco

29	168	6
36	852	24

Chain Lake Dr.

Lakelands Blvd/NSLC @ Chain Lake Drive

Date of Count: June 12, 2002

TPW 0.95
Growth 0.00%

NSLC Driveway

12	44	3
2	8	0

3	15
31	22
621	134

Chain Lake

6	2
19	27
132	344

Chain Lake

267	37	271
304	4	237

Lakelands Blvd

Adjusted to June 2002

NSLC Driveway

11	42	3
2	8	0

3	14
29	21
590	127

Chain Lake

6	2
18	26
125	327

Chain Lake

254	35	257
289	4	225

Lakelands Blvd

Susie Lake Cr/Washmill Ct @ Chain Lake Drive

Date of Count: June 12, 2002

TPW 0.95
Growth 0.00%

Chain Lake Dr

388	170	21
224	167	4

278	186
52	12
10	2

0	7
8	110
3	24

Adjusted to June 2002

Chain Lake Dr

369	162	20
213	159	4

264	177
49	11
10	2

0	7
8	105
3	23

Susie Lake

4	113	13
13	274	36

Chain Lake Dr.

Washmill

Susie Lake

4	107	12
12	260	34

Chain Lake Dr.

Susie Lake

Lakelands Blvd/Hwy 103 On Ramp @ Trunk #3

Date of Count: June 17, 2002

TPW 0.92
Growth 0.00%

Lakelands Blvd

250	268	549
104	38	218

266	276
436	372
4	8

Trunk #3

444	439
223	528
136	386

Trunk #3

0	0	0
0	0	0

Hwy 103 On Ramp

Adjusted to June 2002

Lakelands Blvd

230	247	505
96	35	201

245	254
401	342
4	7

Trunk #3

408	404
205	486
125	355

Trunk #3

0	0	0
0	0	0

Hwy 103 On Ramp

HW 102 SB Ramp @ Lacewood Drive Extension

Date of Count: June 21, 2001

TPW 0.92
Growth 3.00%

Lacewood

157	675	

NB On Ramp

231	
2	
278	

NB Off Ramp

357	740	

Lacewood

Adjusted to June 2002

Lacewood

149	640	0
0	0	0

0	0
0	0
0	0

NB On Ramp

219	0
2	0
263	0

NB On Ramp

0	0	0
338	701	0

Lacewood

HW 102 NB Ramp @ Lacewood Drive Extension

Date of Count: June 21, 2001

TPW 0.92
Growth 3.00%

Lacewood

	726	152

	184
	242

NB On Ramp

NB Off Ramp

	782	173

Lacewood

Adjusted to June 2002

Lacewood

0	688	144
0	0	0

0	174
0	0
0	229

NB On Ramp

0	0
0	0
0	0

NB On Ramp

0	741	164
0	0	0

Lacewood

Appendix E

Future Build Out Impacts
Performance Index

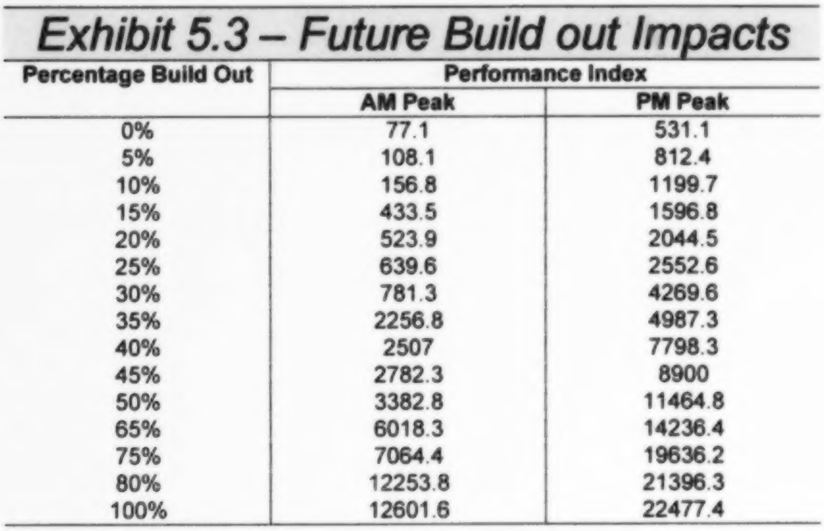


Exhibit 5.3 – Future Build out Impacts

Percentage Build Out	Performance Index	
	AM Peak	PM Peak
0%	77.1	531.1
5%	108.1	812.4
10%	156.8	1199.7
15%	433.5	1596.8
20%	523.9	2044.5
25%	639.6	2552.6
30%	781.3	4269.6
35%	2256.8	4987.3
40%	2507	7798.3
45%	2782.3	8900
50%	3382.8	11464.8
65%	6018.3	14236.4
75%	7064.4	19636.2
80%	12253.8	21396.3
100%	12601.6	22477.4

Appendix F

Collision Analysis Report

Overview

The Nova Scotia Department of Transportation and Public Works provided SGE Acres with detailed records of collisions occurring within the study area over the period from 1996 to 2002 (to May 26). This data included a total of twenty locations. From the data provided, the following items were considered most relevant[1] to our analysis:

- Location (roadway section or intersection)
- Time of collision
- Severity (property damage, personal injury, or death)
- Number of vehicles involved
- Collision Configuration.

These items were transferred to a tabular database. Exhibit F1 shows a series of summary graphs that show the results of the tabulation, providing an accident history for the whole study area. It represents 428 collisions, and there has been an upward trend in the number over the study period. The projected number of collisions in 2002 (based on 36 collisions to the end of May) is 86, which is 69% higher than the number of collisions reported in 1996. This substantial increase can be attributed to an overall increase in traffic volumes throughout the study area. Increased congestion leads to increased conflicts, which leads to more collisions.

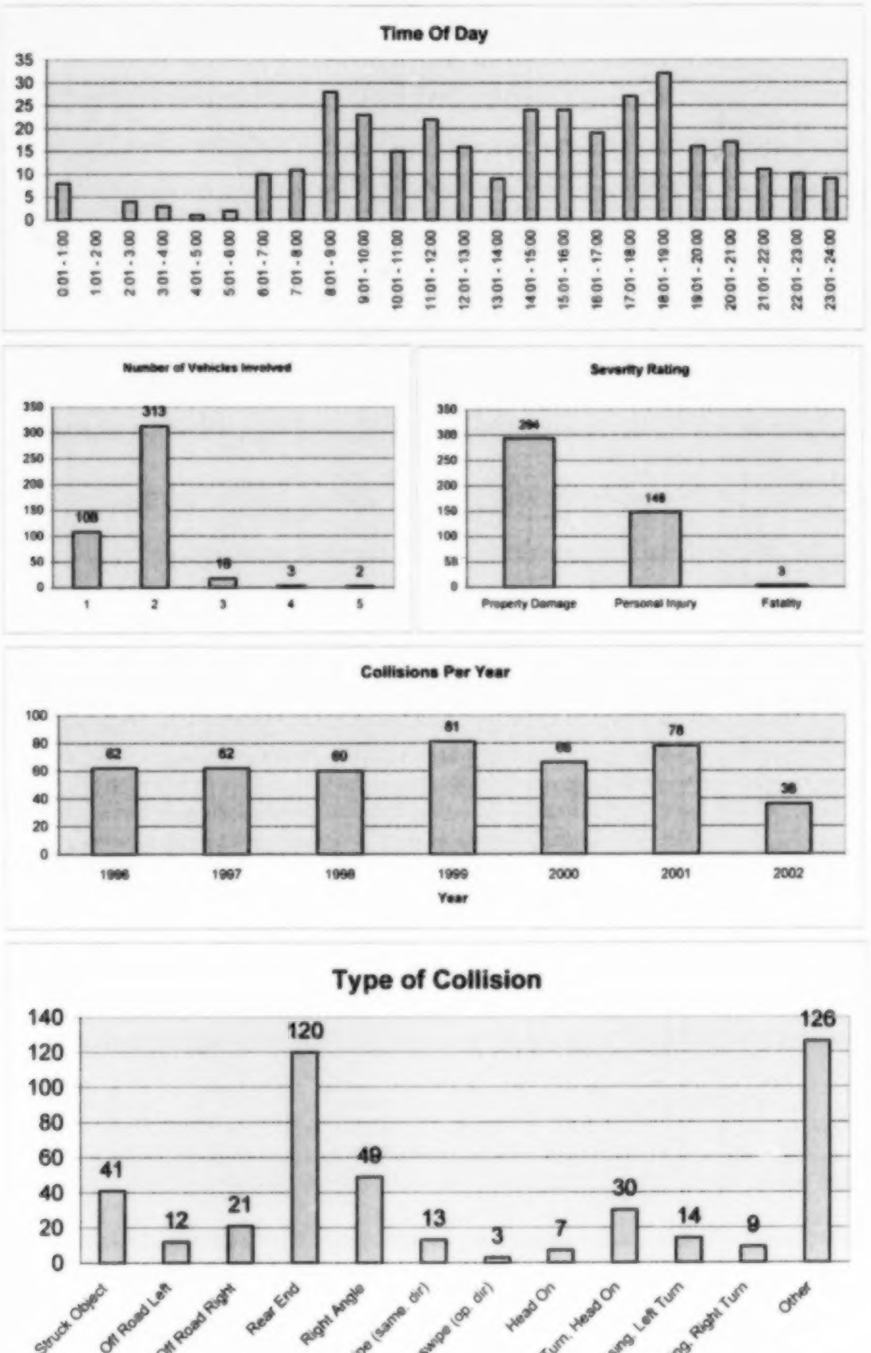
The exhibit shows that collisions occur at any time of day, except between 1:00 AM and 6:00 AM, when collisions are rare (traffic volumes are typically very low at this time of day as well). The frequency of collisions follows a peaking pattern similar to traffic volumes. The initial peak is between 8 and 10 AM and later between 5:00 and 7:00 PM. A significant number of collisions also occur during the afternoon period from 2:00 to 4:00 PM.

The exhibit also shows the overall collision severity rating, as well as the number of vehicles involved per collision and number of collisions per year. Collisions mainly result in property damage (65% - note: percentages are rounded for this discussion); followed by personal injury, which occurred in 34 % of the cases. Less than 1 percent of the collisions (three) were fatal during the study period. This compares to the provincial ratio of 70% property damage, 30 % personal injury and less than 0.15 percent fatalities of involving a collision in urban road conditions.

---

[1] Other data, including date, day of the week, weather conditions, posted speed, road classification and descriptive information was available but not tabulated. This information was reviewed on an individualized basis as part of the analysis. Traffic volume data was also accessed as part of the analysis.

Exhibit F1 - Total Study Area (445 Collisions)



Most collisions were the result of two vehicles coming into conflict in some way (70%). As shown in the exhibit, nearly a third of the two-car collisions were rear end collisions (31%). This type of collision usually occurs in congested conditions and typically results from driver inattention. The remaining collision types varied widely with the second most frequent being left turn head on collisions (10 %). This type of collision is typically the result of collisions at driveways or intersections.

The peaking of collisions shown in the chart relates to the heavy retailing function in part of the study area. Thus there was a need to analyze the data more finely at the intersection, section and sector levels to get a better understanding of the key problem areas. This analysis will be discussed next.

Detailed Analysis

From the list of twenty collision locations available for review, a subset of seven locations, representing those with the highest number of collisions, was identified for detailed analysis and discussion. These were:

Intersections:

- Trunk 3 (St. Margarets Bay Road) at Route 333 (Prospect Road)
    - 62 collisions between 1996 and late May 2002.
- Trunk 3 (St. Margarets Bay Road) at Lakelands Boulevard
    - 42 collisions.
- Trunk 3 (St. Margarets Bay Road) at Highway 103
    - 30 collisions.

Sections

- Highway 103 (Exit 1-Highway 102) to Exit 2 (Beechville)
    - 69 collisions.
- Highway 103 between Exit 2 (Beechville) and Exit 3 (Timberlea / Otter Lake)
    - 54 collisions.
- Highway 102 between Exit 1A (Hwy 103) and Exit 2A (Bayers Lake)
    - 43 collisions.

Sector

- Bayers Lake Business Park
    - 87 collisions.

The problem locations are illustrated on the map in Exhibit F2.

1) Intersection of Trunk 1 (St. Margarets Bay Road) at Route 333 (Prospect Road)

This is a signalized tee intersection experiencing the most collisions of any individual intersection in the study area. The approaches are either long and straight (Prospect Road and west leg of Trunk 3) or a broad curve (east leg of Trunk 3). Analysis (see Exhibit F3) shows a large proportion of the collisions (27%) occurred between 5:00 and 7:00 PM. No other time period showed nearly as high a tendency for collisions. This time period reflects the work to home "rush hour" period when traffic volumes are highest at the intersection. Aggressive driver behaviour or driver inattention appears to have been a factor in many of the collisions. A majority were rear end collisions (42 %), followed by left turn, head on collisions (24%). Over the study period, there were six incidents where a vehicle collided with a deer. The number of collisions at this intersection has fluctuated with no real distinguishing trend. Interestingly, there has been only one collision in 2002 (to the end of May).

The recommended improvement for this intersection, as presented in Section 7, is the provision of a double left turn lane on the eastbound approach of Trunk 3.

2) Intersection of Trunk 3 (St. Margarets Bay Road) at Lakelands Boulevard

This intersection experiences a high proportion of rear end collisions (35%), with no other collision type showing such prominence (Exhibit F4). However, the number of unspecified collisions (as coded) was high, accounting for 33 % of the collisions. When these collisions were reviewed, it was concluded that most of the unspecified collisions were sideswipes or rear end collisions. These problems highlight the principal deficiency with the intersection. Sideswipes tend to occur as a result of the merge of westbound ramp traffic and Trunk 3 traffic. The problem is compounded by the breadth, curvature and incline of the road, which combine to make the lane markings difficult to see. Channelized right turns at the intersection may also contribute to the number of sideswipe collisions. The rear end collisions occur at the signals as a result of traffic coming to an abrupt stop after a long run. Most traffic moves at speed as it approaches the intersection. The sharp turn at the terminus of Lakelands Boulevard may also be the cause of some rear end collisions.

The recommendations call for the elimination of the merge lane and the removal of some traffic at the intersection. An overall traffic reduction is anticipated as a result. Removal of the right turn channelized turning lanes may result in a reduced number of rear end collisions.

3) Intersection of Trunk 3 (St. Margarets Bay Road) at Highway 103 (Exit 2)

This is an intersection of the Trunk 3 and the exit and access ramps on Highway 103. More than 85 percent of the collisions at this intersection involved two vehicles (Exhibit F5). The rate of collision has averaged between 4 and 5 per year over the six and a half year review period. However, in 2001, there were 10 collisions, including one fatality. increase in the frequency of collisions appears mainly related to a growth in traffic volumes. Most collisions occurred in the afternoon between 2:00 PM and 7:00 PM.

Collisions are of varying types: right angle 25(%), rear end (22%), and left turn head on (16%). Many of the collisions have been the result of turning conflicts. The increased traffic volumes result in reduced availability of gaps for turning vehicles. Drivers in such cases often become frustrated by the long delays and may attempt to use smaller gaps to complete their movement. SGE Acres is informed that HRM and TPW plan to remedy this problem by installing traffic signals at the intersection in 2002 or early 2003.

4) Section of Highway 103 between Exit 1 (Highway 102) and Exit 2 (Beechville)

Over the study period, an average of 10 to 11 collisions per year occurred on this section of highway (Exhibit F6). The worst year was 1999 when there were 15 collisions. Since that time the collision rate has hovered near the average. About a third of the collisions were single car mishaps while the majority of the remainder involved two cars (there was one three-car collision). The most common type was rear end collisions (28%), resulting from periodic stoppages on the roadway due to traffic congestion (peak hour). Nearly 17% of the collisions involved striking an object, including four deer. A pedestrian was hit and killed by a vehicle on the highway in 1998.

5) Section of Highway 103 between Exit 2 (Beechville) and Exit 3 (Timberlea / Otter Lake)

There were 54 collisions on this section during the study period, and the number has been in modest decline - from a high of 13 in 1997 to 5 in each of 2000 and 2001 (Exhibit F7). This improvement appears to have been related to the twinning of the highway during the study period. The percentage of collisions involving more than one vehicle has also decreased since the highway was twinned. In 1999 there was one fatality in which a car passed another at high speed and lost control. Both vehicles left the highway after the cars collided (sideswipe, same direction).

A large proportion of accidents on this section involved single vehicle events. These mainly involved driving off the road (left or right side - 23 percent).

6) Section of Highway 102 between Exit 1A (Hwy 103) and Exit 2A (Bayers Lake)

This section of highway has seen a majority of collisions occurring in the morning and afternoon rush periods (7:00 to 10:00 AM and 5:00 and 8:00 PM – see Exhibit F8). The number of vehicles involved was about evenly distributed between one or two cars. Two car collisions were typically rear end collisions. There was one 3-car collision and one 5-car collision. Weather and road conditions often played a role, particularly in single-car accidents, which typically involved running off the road or striking an object. Five incidents involved hitting or avoiding a deer. The frequency of collisions has varied between 3 and 10 per year.

7) Bayers Lake Business Park Sector

Chain Lake Drive in Bayers Lake Business Park experienced a total of 104 collisions during the study period (Exhibit F9). A majority of the collisions were focused at three key intersections: Susie Lake Drive (2 closely spaced intersections; 37 collisions), Lacewood Drive (26), and Lakelands Boulevard (20). Considering the high volumes of traffic handled in the Business Park, the frequency of collisions is low. As a result, we have elected to analyze the collisions as a group. The typical collision in the business park involves two vehicles (80%). Right angle and rear end collisions are the most common (23 and 14% respectively). A substantial percentage of collisions (34%), were not specified. Most involved property damage (only 20 percent resulted in injuries). This can be attributed to the relatively low average running speed. Note: time of day information was not available for this sector.

Summary and Conclusion

Collision records for more than 400 reported incidents were tabulated and analyzed. Those intersections, roadway sections and sectors that had the highest collision rates were analyzed and discussed in further detail. The collision rates within the study area vary widely, and generally increase in proportion to increases in traffic volumes. The number of collisions at intersections tends to increase during the morning and afternoon peak periods, reflecting the preponderant nature of the streets as commuter routes (except those in the Bayers Lake area). Collisions on highway sections tend to be single car related and collisions occur most frequently as a result of weather conditions.

The location experiencing the highest collision rate was the intersection of Trunk 3 at Route 333. Recommended changes were identified as a means to reduce the propensity for collisions at this intersection, as well as other intersections experiencing a high number of collisions.

[Exhibits follow.]

Exhibit F4 - St. Margarets Bay Road (Trk 3) & Laklands Blvd. (42 Collisions)

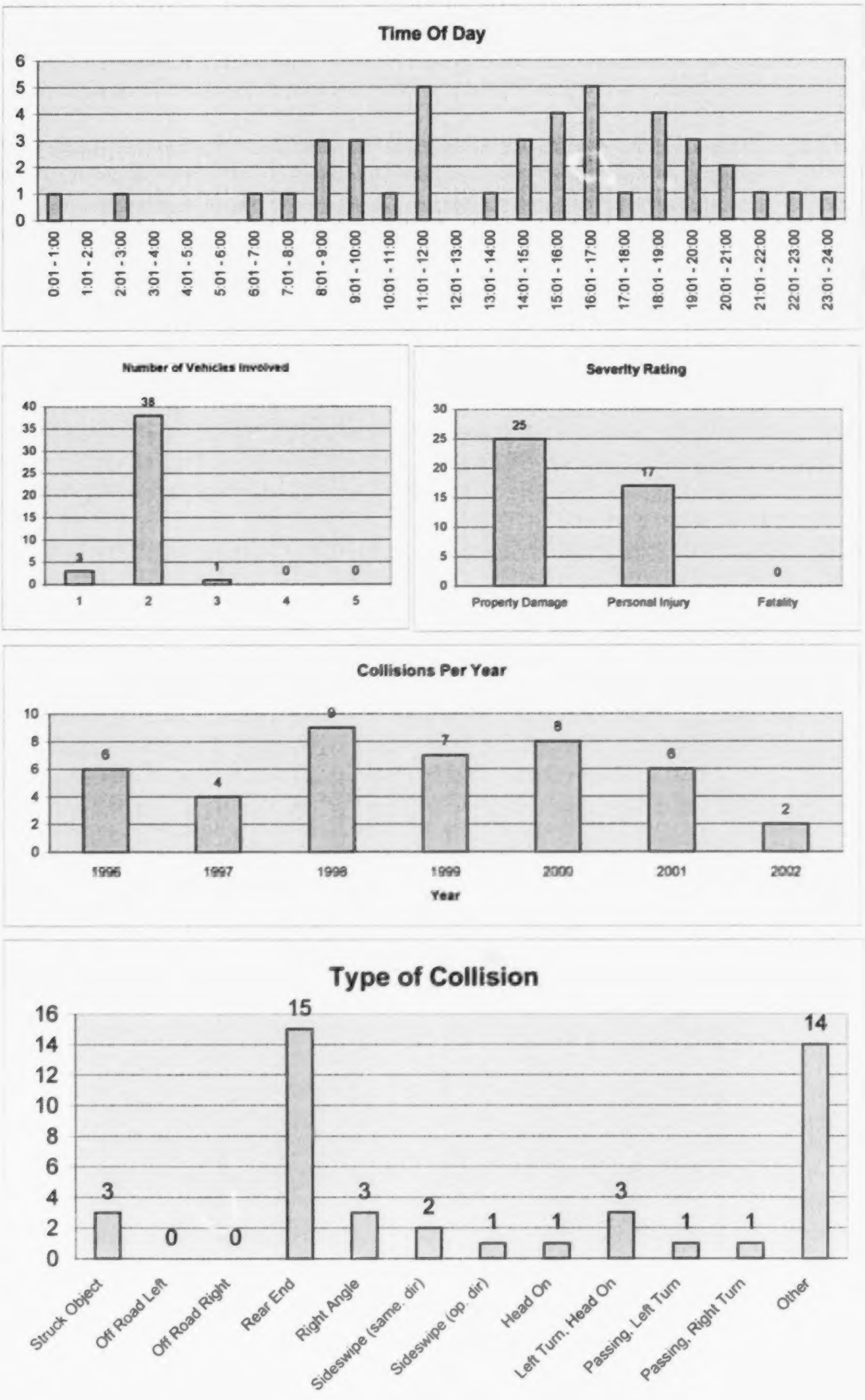
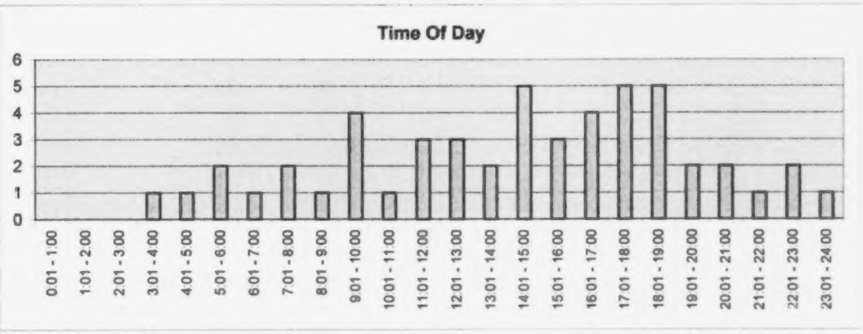
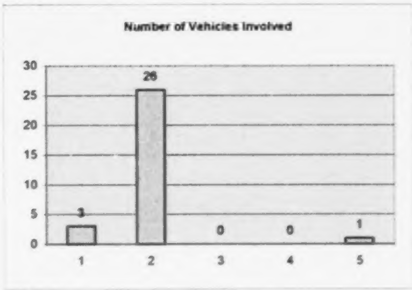
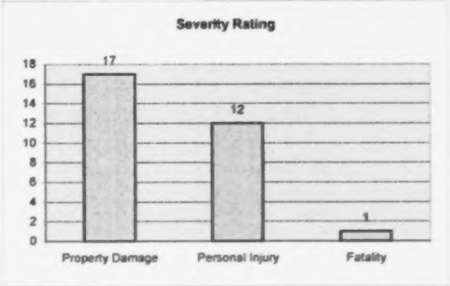
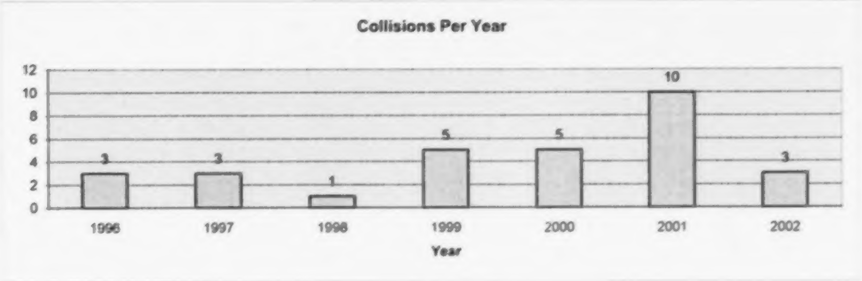


Exhibit F5 - St. Margarets Bay Road (Trk 3) & Highway 103 (30 Collisions)









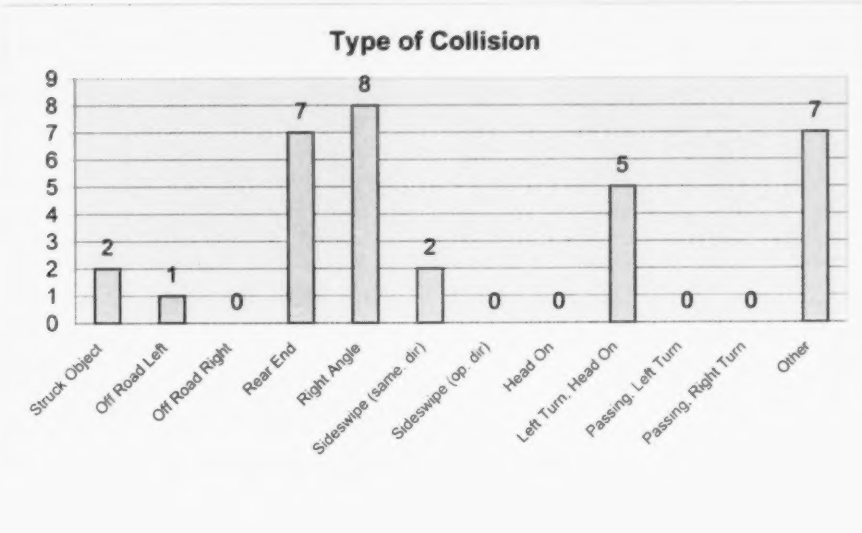
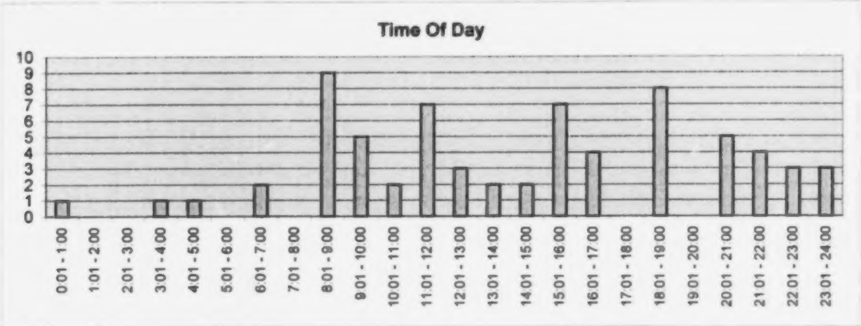
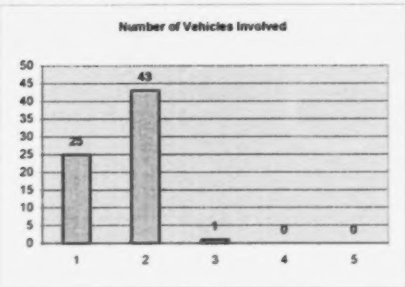
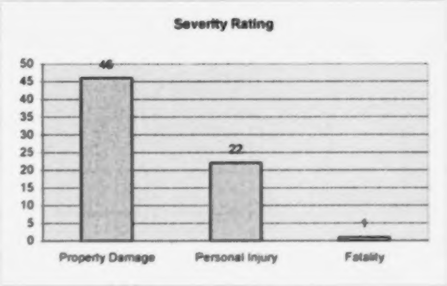
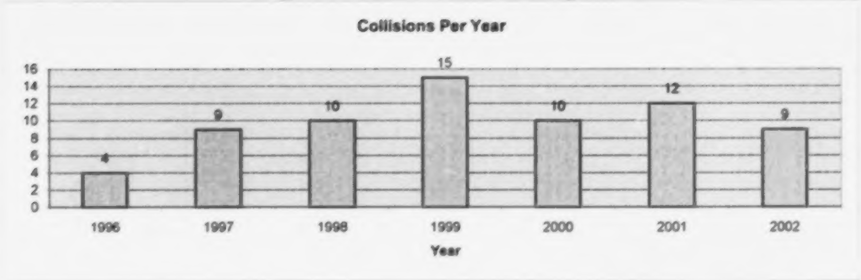


Exhibit F6 - Highway 103 Exit 1 (Hwy 102) to Exit 2 (Beechville) (69 Collisions)









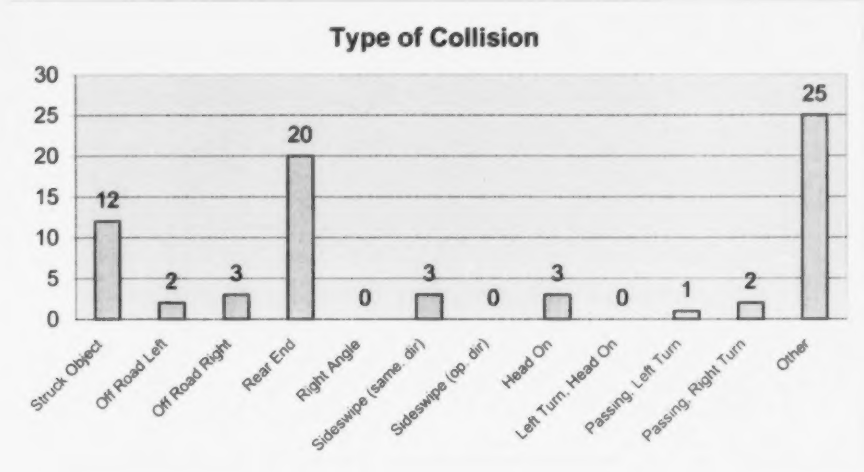
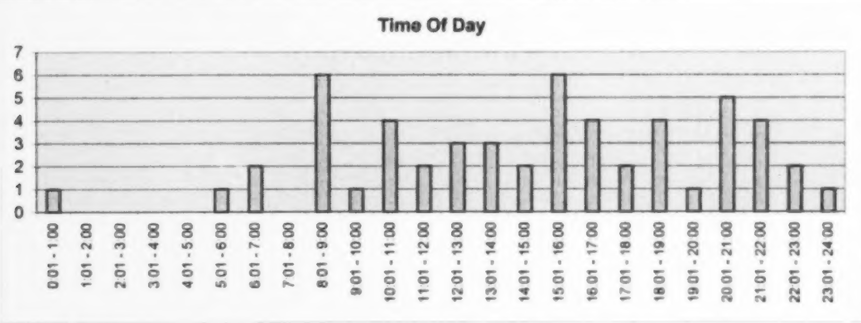
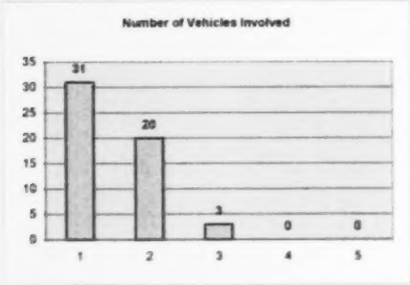
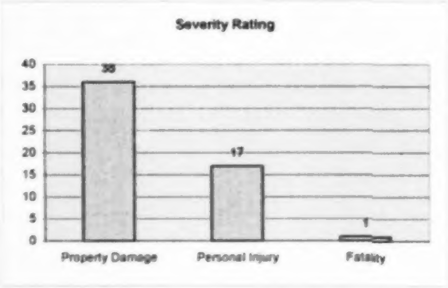
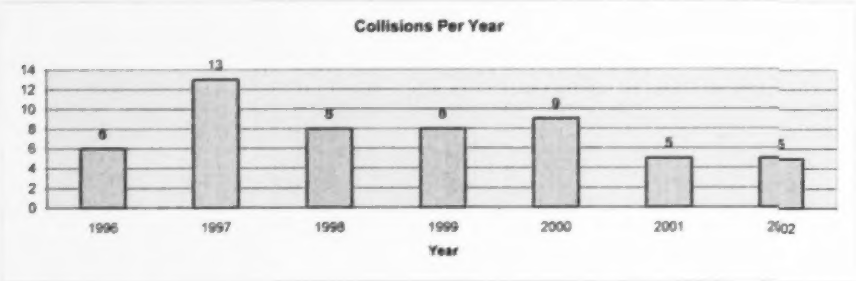


Exhibit F7 - Highway 103 Exit 2 (Beechville) to Exit 3 (timberlea) (54 Collisions)









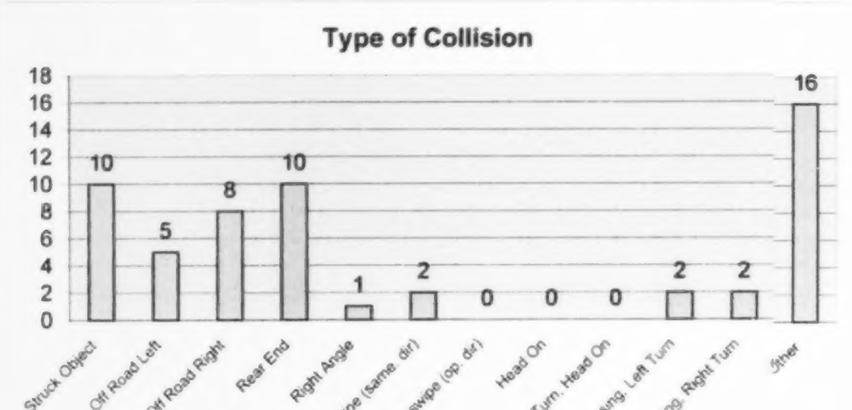
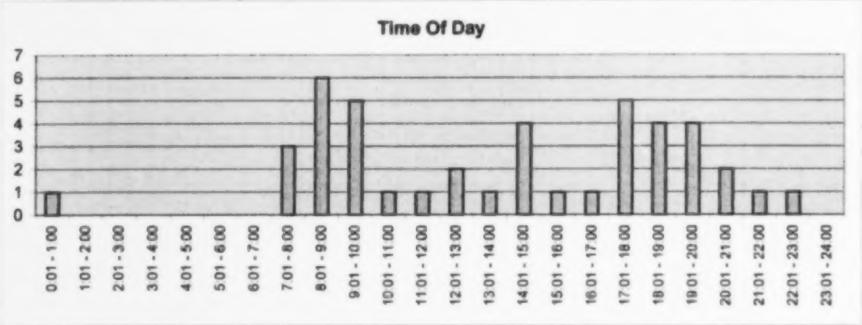
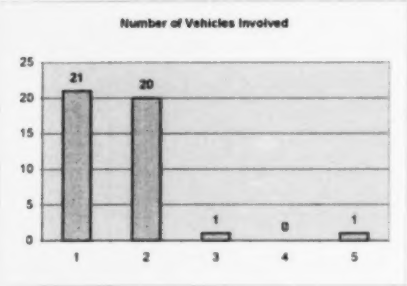
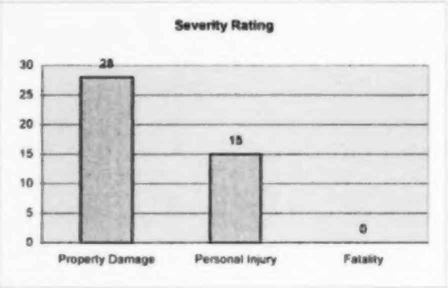
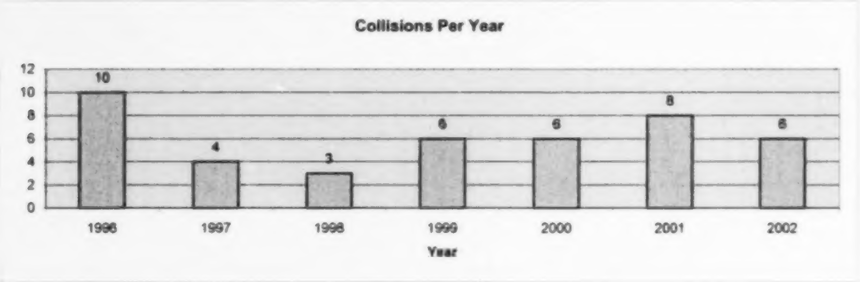


Exhibit F8 - Highway 102 Exit 1A (Hwy 103) to Exit 2A (Bayers Lake) (43 Collisions)


Time Of Day


Number of Vehicles Involved


Severity Rating


Collisions Per Year

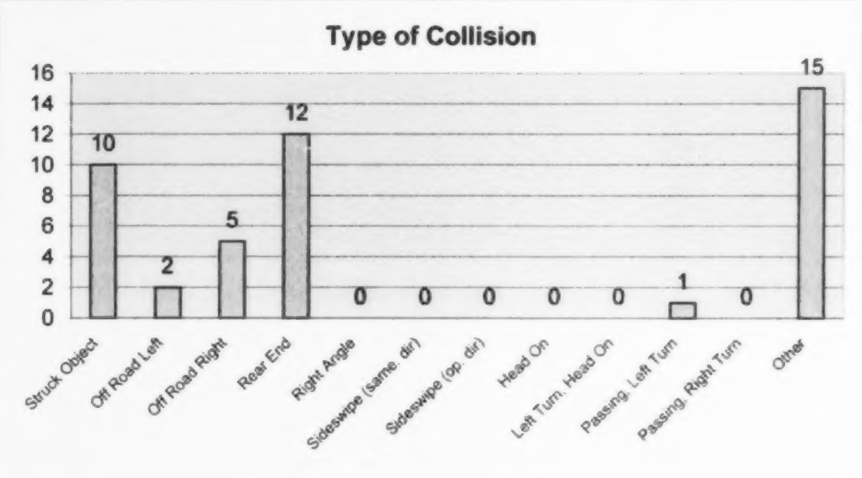
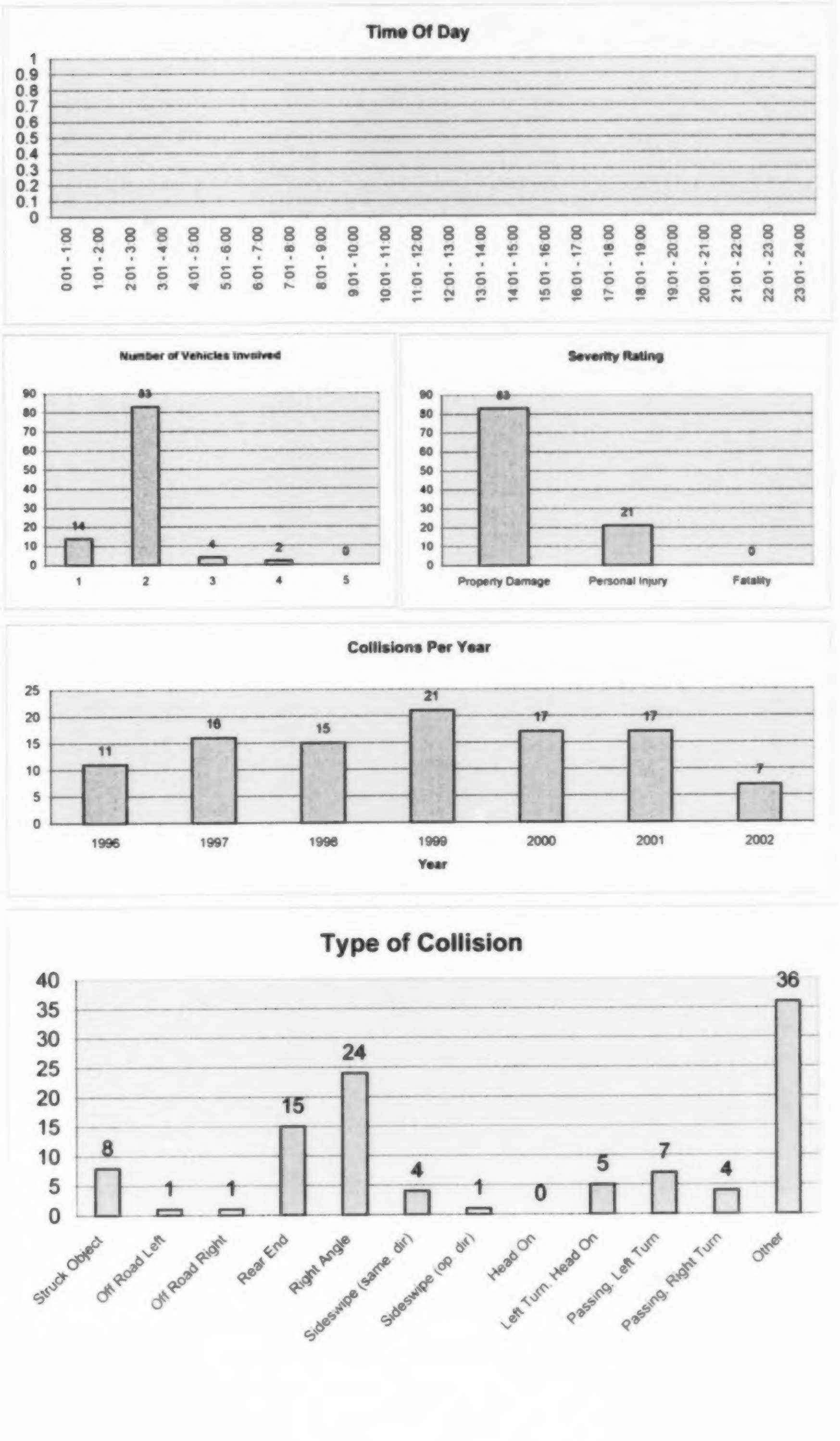

Type of Collision

Exhibit F9 - Total (Chain Lake Dr. only) (104 Collision)



Appendix G

Exit 2 - Recommended Interchange Reconfiguration
(in envelope)